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Expedited Response Action Proposal for 316-5 Process Trenches

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ACRONYMS

ARAR	applicable or relevant and appropriate requirements
CERCLA	*Comprehensive Environmental Response, Compensation and Liability Act of 1980*
CX	categorical exclusion
DCG	derived concentration guideline
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EE/CA	engineering evaluation and cost analysis
EPA	U.S. Environmental Protection Agency
ERA	expedited response action
FS	feasibility study
MCL	maximum contamination level
NEPA	*National Environmental Policy Act of 1969*
NR	not reported
RCRA	*Resource Conservation and Recovery Act of 1976*
RI	remedial investigation
ROD	Record of Decision
TOC	total organic carbon
TOX	total organic halogen
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company
WIDS	Waste Information Data System

EXPEDITED RESPONSE ACTION PROPOSAL FOR 316-5 PROCESS TRENCHES

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) and Washington State Department of Ecology (Ecology), in a letter dated December 20, 1990 (Appendix A), encouraged the U.S. Department of Energy (DOE) to proceed with the planning necessary to implement an expedited response action (ERA) for the 300 Area 316-5 Process Trenches. The EPA has been designated the lead regulatory agency, with Ecology the support agency, for the ERA. The ERA has been classified as non-time-critical and will be conducted in accordance with the applicable sections of 40 CFR 300, Subpart E (EPA 1985); the *Hanford Federal Facility Agreement and Consent Order* (Part 3, Article XIII, Section 38) (Ecology et al. 1989); the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA), and the *Resource Conservation and Recovery Act* (RCRA). A non-time-critical ERA requires preparation of an engineering evaluation and cost analysis (EE/CA). The EE/CA is a rapid, focused evaluation of available technologies using specific screening factors to assess feasibility, appropriateness, and cost. The EE/CA as incorporated in this proposal will be submitted to the regulators and will undergo a 30-day public comment period. After public comment an Action Agreement Memorandum is expected to be issued by the EPA authorizing implementation of the ERA proposed activities.

1.1 BACKGROUND

On October 18, 1990, an Agreement in Principle between the DOE, the EPA, and the State of Washington was signed (Appendix B). The agreement stated that, initially, three candidate sites would be considered for ERAs:

- 618-9 Burial Ground remediation
- 300 Area Process Trenches sediment removal
- 200 West Area carbon tetrachloride treatment.

On December 20, 1990, the EPA and Ecology forwarded a letter signed by both agencies encouraging the DOE to proceed with the planning necessary to implement the 300 Area Process Trench ERA.

1.2 OBJECTIVE OF THE EXPEDITED RESPONSE ACTION

The objective of the ERA is to remove contaminated sediments from the active trenches and minimize the potential for migration of the contaminants through the soil column to groundwater. The ERA will be conducted as an interim action pending final cleanup activities for the 300-FF-1 operable unit.

The ERA activities will be conducted to minimize impacts on the ongoing remedial investigation (RI) and feasibility study (FS) tasks for the 300-FF-1 and 300-FF-5 operable units.

2.0 SITE DESCRIPTION

2.1 LOCATION AND PHYSICAL DESCRIPTION

The 316-5 Process Trenches are an active RCRA treatment, storage, and disposal (TSD) unit located within the 300-FF-1 operable unit (Figure 1). The trenches also impact the 300-FF-5 groundwater operable unit, which is located beneath the 300 Area. Both operable units are categorized as CERCLA past practice units (Ecology et al. 1989). The trenches are located near the western boundary of the 300-FF-1 operable unit, approximately 300 m (1,000 ft) west of the Columbia River. The trenches are approximately 458 m (1,500 ft) in length, 3.5 m (11 ft) deep, 3 m (10 ft) wide at the bottom, and 10 m (30 ft) wide at the top. The two parallel trenches are separated by an earthen berm (Figure 2). The bottom of each trench slopes slightly to the north and is approximately 6.5 m (20 ft) above the water table (Figure 3). There is a small 30- by 50- by 3-m (90- by 150- by 9-ft) depression located at the northwest corner of the west trench. The depression was isolated from the west trench in June 1990 by an earthen berm constructed to facilitate placing screens over the trench. Appendix C provides a recent summary report from the Waste Information Data System (WIDS) (WHC 1990b) for the 316-5 Process Trenches.

2.2 DESCRIPTION OF PRESENT OPERATING CONDITIONS

The trenches presently operate under a RCRA Interim Status Permit. The trenches were constructed and activated in 1975. Process liquid effluent from various locations within the 300 Area is collected in the process sewer and discharged into a concrete outlet structure located at the south end of the trenches. The effluent discharged to the trenches averages 3,500 L/min (900 gal/min) and ranges from 3,000 to 4,500 L/min (800 to 1,200 gal/min). Peak discharges to the trenches may have been as high as 11,360,000 L/day (3,000,000 gal/day) (WHC 1990a). Before 1985, when administrative controls were instituted to reduce and eliminate discharges of hazardous wastes to the process trenches, small quantities of hazardous wastes may have been discharged to the trenches. Substances discharged to the trenches before 1985 were slightly radioactive and hazardous. Table 1 provides an estimate of these materials. The present effluent discharge consists of (1) purified or potable water; (2) equipment cooling water; (3) laboratory and research facility waste water; and (4) precipitation (e.g., rain and snowfall runoff). The potable water and equipment cooling water are estimated to account for 70% of the flow discharged to the trenches (WHC 1990a). The fuel fabrication activities conducted in the 300 Area may have been the most significant source of contaminants. The fuel fabrication facilities have not been operated since early 1987.

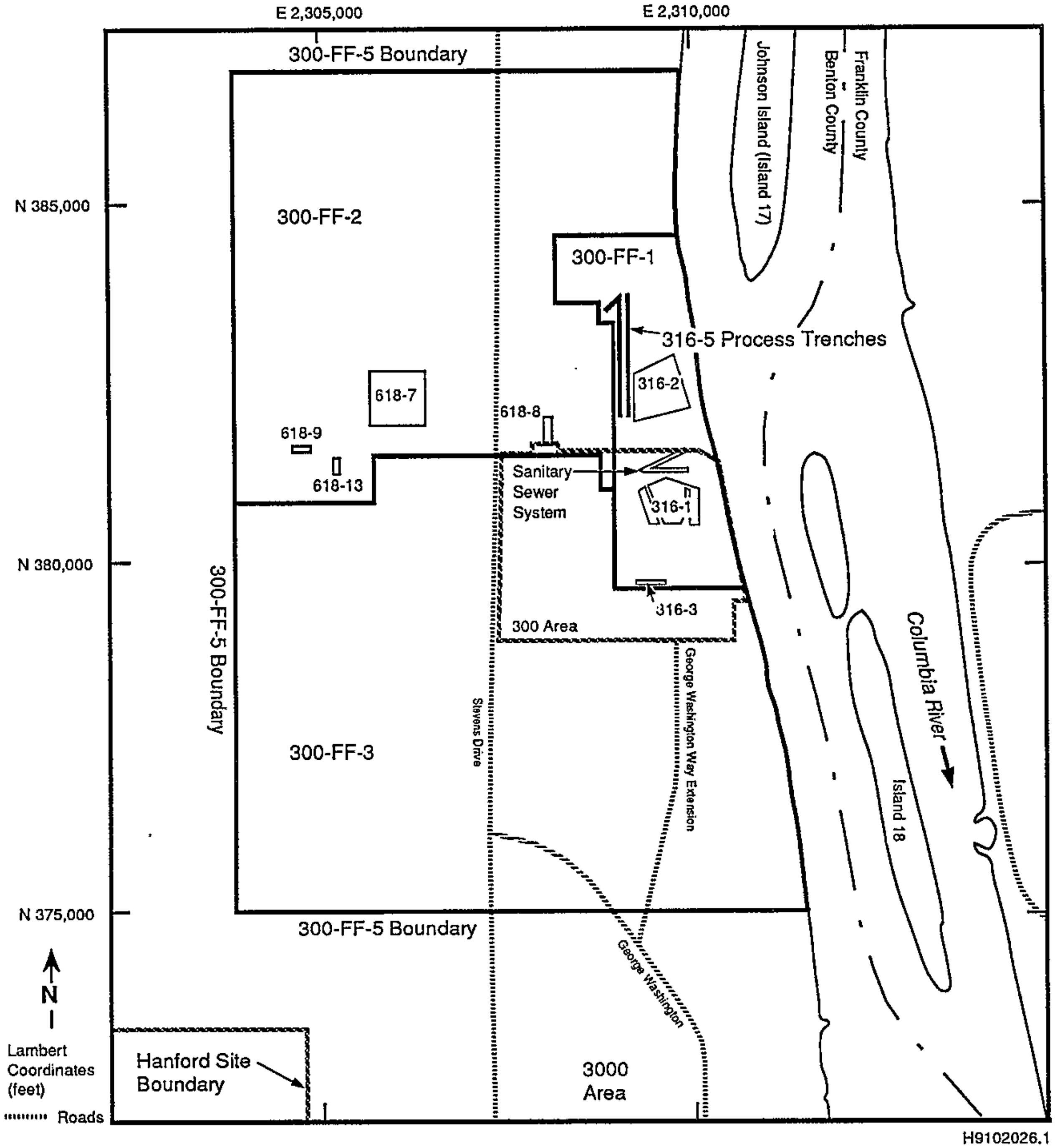

Figure 1. Location of the 316-5 Process Trenches in the 300-FF-1 Operable Unit, Hanford Site, Richland, Washington.

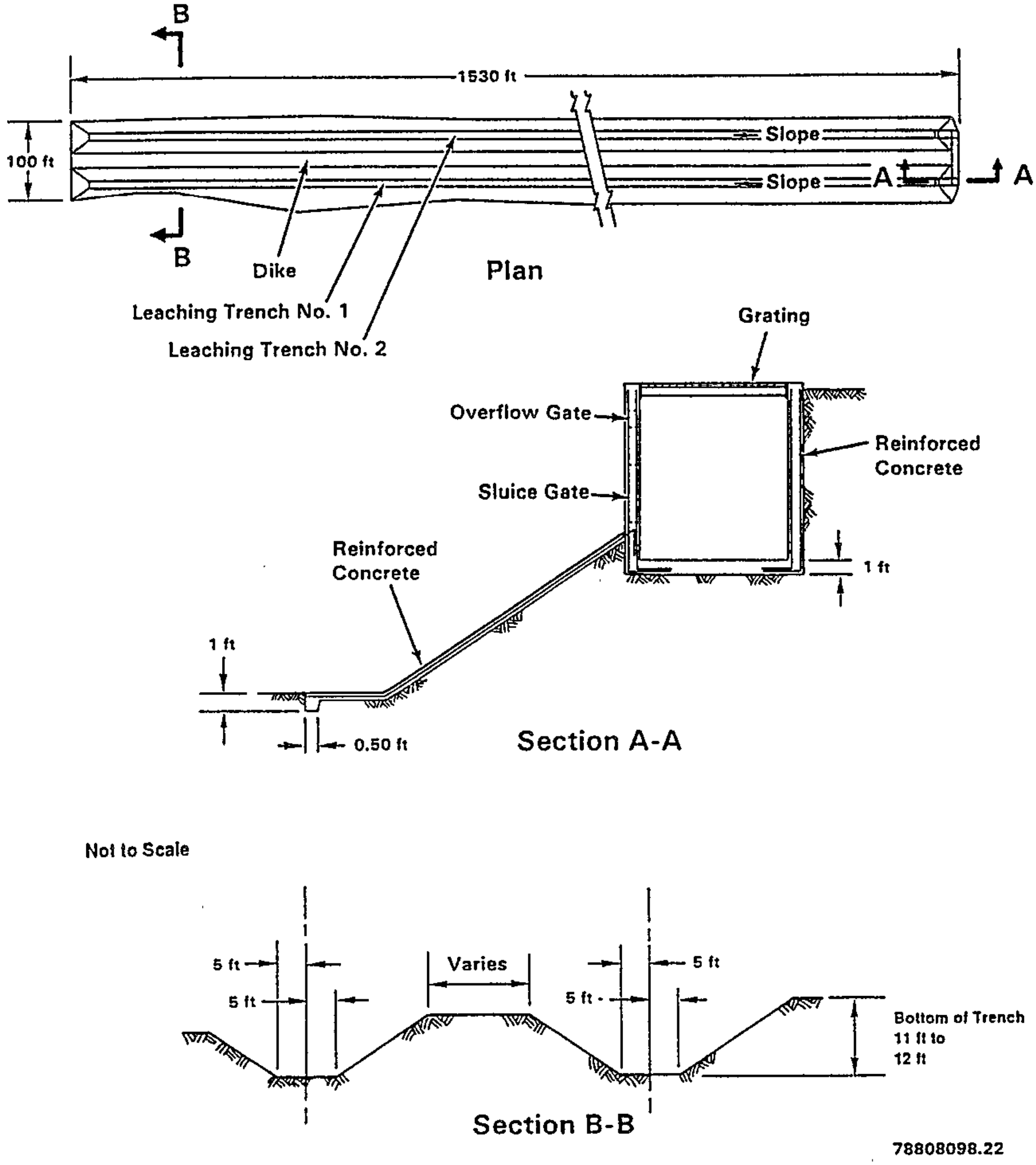

Figure 2. The 316-5 Process Trench Construction Information.

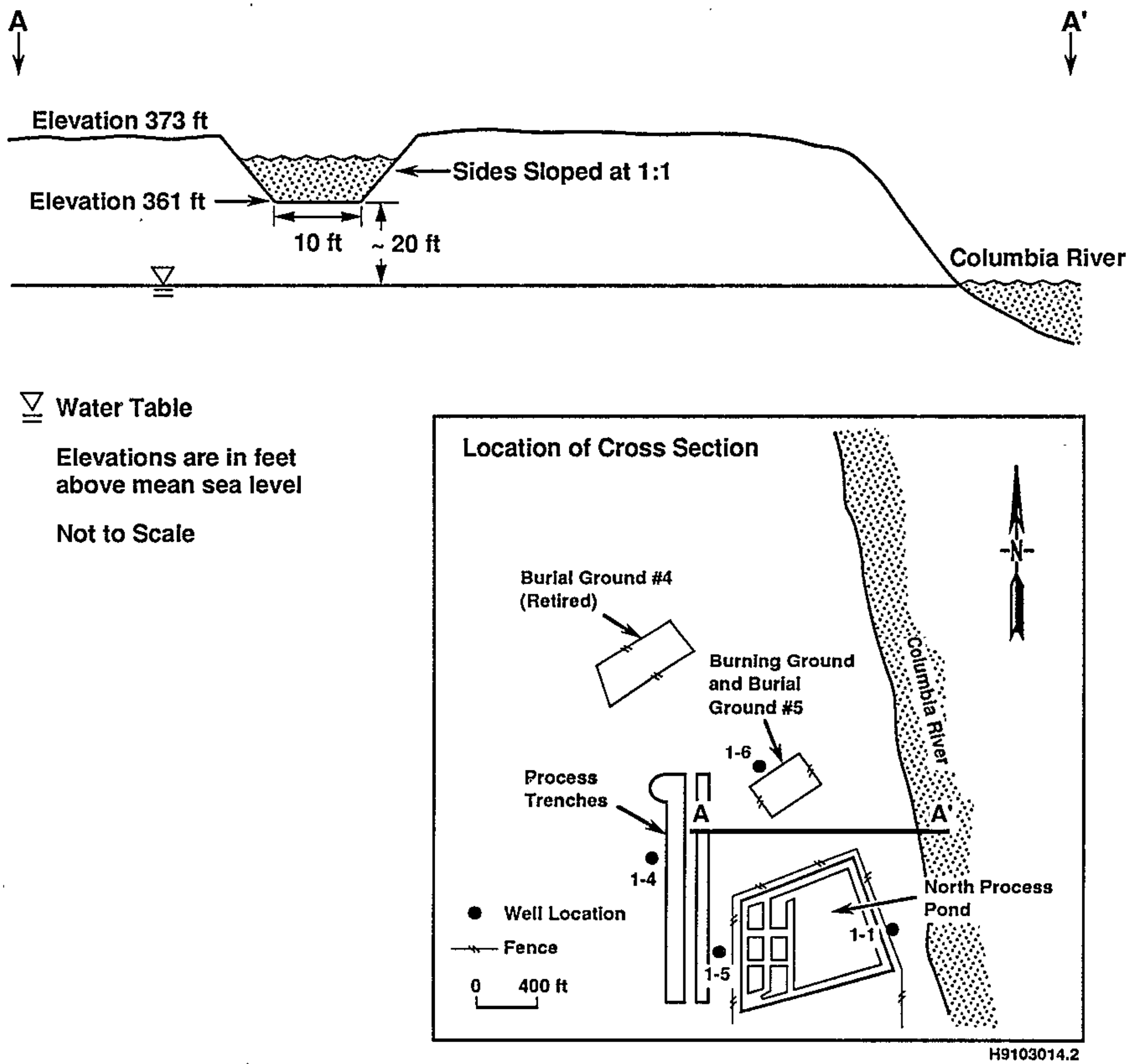

Figure 3. The Schematic Cross Section of the 300 Area Process Trenches (Source: Schalla et al. 1988).

Table 1. Estimated Nonradiological Chemical Waste Inventory for the Process Trenches (before implementation of administrative controls on February 1, 1985).

Intermittent discharges		Larger discharges[a]	
<g	<kg		
Ammonium biofluoride	Benzene	Copper	~30 kg/month
Antimony	Carbon tetrachloride	Detergents	≤30 kg/month
Arsenic	Chromium	Ethylene glycol	≤200 L/month
Barium	Chlorinated benzenes	Heating oil	~300 L[b]
Cadmium	Degreasing solvents	Hydrofluoric acid	~100 kg/month
Dioxine	Formaldehyde	Nitrates	≤2,000 kg/month
Dioxin[c]	Formic acid	Nitric acid	≤300 L/month
Hydrocyanic acid	Hexachlorophene	Paint solvents	≤100 L/month
Pyridine	Kerosene	Tetrachloroethylene	~450 L[b]
Selenium and compounds	Lead	Photo chemicals	≤700 L/month
Thiourea	Methyl ethyl ketone	Sodium chloride	~75 ton/yr
Miscellaneous laboratory chemicals	Mercury	Sodium hydroxide	≤300 L/month
	Naphthalene	Uranium	~20 kg/month
	Nickel		
	Phenol		
	Silver		
	Sulfuric acid		
	Tetrachloroethylene		
	Toluene		
	Tributylphosphate (paraffin hydrocarbon solvents)		
	1,1,1-trichloroethane		
	Trichloroethylene		
	Xylenes		

Source: DOE (1985).

[a]These discharges, except for the spills, were relatively continuous.

[b]Known spills.

[c]Included only because of the potential for dioxin to exist as trace impurity in chlorinated benzenes.

The effluent currently discharged to the trenches is not designated as a dangerous waste according to procedures specified in the Washington Administrative Code (WAC), Chapter 173-303. The administrative controls implemented in 1985 directed attainment of drinking water standards for effluent discharged to the trenches (WHC 1990a).

2.3 FUTURE OPERATIONAL PLANS

Future activities associated with effluent discharged to the process trenches are expected to be similar to present activities. The various sources that contribute to the overall chemical constituents in the effluent may change, but the overall environmental safety of the operation will not degrade. Current projects for the trenches include obtaining a substantial reduction in flow from cooling water sources and construction of an effluent inspection and treatment facility that would eliminate discharges to the trenches. Preliminary indications show that the estimated flow to the trenches may be reduced from the present 4,500 L/min (1,200 gal/min) to 1,200 L/min (300 gal/min) over the next few years.

2.4 NATURE AND EXTENT OF CONTAMINATION

The source of contaminants is the process sewer system, which originally was constructed in 1943 to transfer process liquid wastes (i.e., process sewage) from the various buildings in the 300 Area to the 316-1 South Process Pond. The system was extended in 1948 to serve the new 316-2 North Process Pond, modified in 1953 to allow for either simultaneous or alternating use of the south and north ponds, and extended once again in 1975 to transfer wastes to the 316-5 Process Trenches (DOE 1985).

The process sewer system has 50 or more connections in the 300 Area. The system is constructed of several types of materials (e.g., vitreous clay, cast iron, steel, concrete, polyvinyl chloride, and stainless steel). In addition to process water from fuel fabrication operations, the process sewer system receives, or has received, cooling water, steam condensate, water treatment salts, and a wide variety of waste liquids from laboratory drains throughout the 300 Area. Because of the number of laboratories in the area and the diverse nature of the research and development activities over the years, practically any chemical used in the 300 Area may have been discharged to the system in laboratory quantities and subsequently to the process trenches. Chemical spills are known to have entered the process sewer system through the many floor drains in 300 Area buildings (DOE 1985).

Some of the substances discharged to the process sewer were radioactive. The radioactive materials burden to the system was removed in 1953 when a separate laboratory waste transfer and disposal system was installed. The laboratory system was operated independently of the process sewer system until 1963. In 1963, the systems were reintegrated with retention basins incorporated to allow for screening wastes high in radioactivity before disposal.

Many unplanned releases are known to have entered the process sewer over the years. Most of these spills consisted of process wastes or chemicals that ultimately were routed to the disposal ponds or trenches.

Administrative controls were implemented in 1985 to eliminate all discharges of hazardous wastes to the process sewer system. Process sewage is monitored for operational purposes (WHC 1990a).

2.5 CONTAMINANTS OF CONCERN

Existing historical data provided in the RI/FS work plan indicate that the process trench sediments are contaminated (DOE-RL 1990) with radionuclides and inorganic components. This ERA will mitigate potential further migration of contaminants into the groundwater, air, surface waters, and sediments by removing contaminated sediments.

Contaminants of concern for the process trenches have been identified based on previous sampling efforts.

2.5.1 Background Data

There has not been sufficient characterization of the site background to provide a meaningful statistical analysis of the total metals in soil. The existing data are limited in depth, number of samples, and range of metals tested. The current RI activities being conducted for the 300-FF-1 and 300-FF-5 operable units should provide the data necessary to evaluate background concentrations of total metals. However, the data will not be available until after completion of initial RI/FS activities.

2.5.2 Soil Sample Data

Soil samples from the process trenches have been analyzed for potential contaminants. The earliest sampling consisted of six composite samples obtained from the west trench. These samples were composited from three depths: 0, 0.3, and 0.6 m (0, 1, and 2 ft) from the trench bottom. The samples were analyzed for a range of metals, including many for which background characteristics are unknown (DOE 1985).

More extensive sampling was implemented in 1986 to specifically address the process trench sediments (Zimmerman and Kossick 1987). Soil samples were obtained at 30.5-m (100-ft) intervals along the bottom of each trench at three depths: 0, 0.1, and 0.46 m (0, 0.3, and 1.5 ft). Figure 4 provides general sample locations. The samples were analyzed for metals, gross alpha and beta, total organic halogen (TOX), and total organic carbon (TOC). Seventeen samples were subjected to a more complete analytical characterization, and six surface soil samples were tested for extraction-procedure toxicity. Appendix D provides a summary of the analytical data for the samples.

Six exploratory borings were drilled on 91-m (300-ft) centers along the berm separating the process trenches during the 1986 investigation (Figure 4).

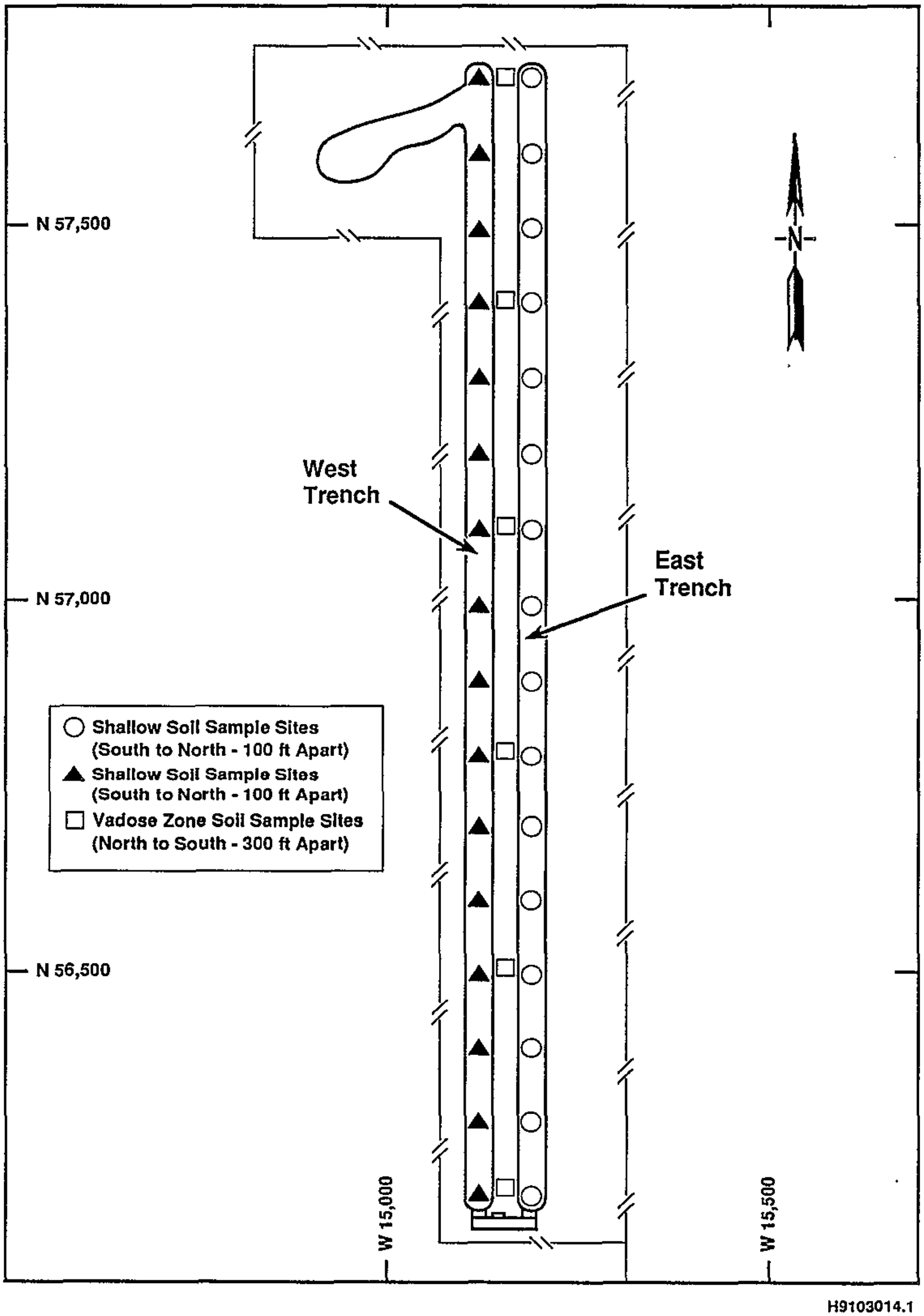

Figure 4. The 316-5 Process Trench Soil Sampling Locations.

Soil samples were taken from drill cuttings at depth intervals of 1.5 m (5 ft) to a maximum depth of 12 to 13.7 m (40 to 45 ft). A list of analytical constituents detected in the process trench sediments is provided in Table 2.

Several metals, including antimony, arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc, were detected at elevated levels. Other metals (e.g., uranium) probably also exist at highly elevated concentrations; however, background distributions for several such metals have not been established.

Extraction-procedure toxicity results for the six process trench soil samples are shown in Table 3. The data indicate that the surface soils may not exceed criteria for dangerous waste designation.

Elevated levels of gross beta and lo alpha (assumed to be gross alpha) indicate the presence of radionuclides in the sediments. Based on the estimated volumes of waste constituents discharged to the process trenches (Table 4), uranium is the dominant radionuclide present. Cleanout of the weir box, conducted in 1987, recovered a substantial amount of uranium. This also indicates that uranium would be the predominate radionuclide. Several organic compounds were identified in the soils; only two compounds, methylene chloride and tetrachloroethylene, were detected in more than one sample. Tetrachloroethylene was the only detected organic compound known to have been disposed of in the trenches in greater-than-kilogram quantities.

A summary of the constituents detected in the deep borings in the berm is presented in Table 5. Beryllium and mercury are the only compounds identified at elevated concentrations. Mercury, however, was detected in fewer than 5% (2 of 45) of the deeper soil samples.

The deeper soil samples may not be representative of the actual vertical extent of soil contamination. These samples were obtained along a line offset from the trench bottoms by approximately 4.6 m (15 ft). Given the nature of the soils underlying the trenches, little lateral dispersion of contaminants by capillary diffusion would be expected. Therefore, the maximum contamination in the deeper soils is expected to be located directly beneath the trenches. The results from the deep, offset borings do, however, indicate that the lateral extent of contamination is limited to the soil column beneath the trenches.

3.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

A basic description of applicable or relevant and appropriate requirements (ARAR) is provided in Section 7.5 of the Action Plan in the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1989). An important point mentioned in the description is that ARARs will be applied where appropriate for ERAs. This is possible because the ERA is an interim action that will be subject to ARARs during the final remediation of a site.

Table 2. Summary of Soil Quality Data for the Process Trenches.

Constituents detected	Detection limit	Maximum value detected (mg/kg)	Detections/ analyses
Lo alpha, pCi/g	NR	1,870	113/113
Gross beta, pCi/g	NR	27,600	108/113
Aluminum	15	19,500	119/119
Antimony	10	140	90/119
Arsenic	0.5	221	29/32
Barium	0.6	485	119/119
Beryllium	0.5	6.0	42/119
Bismuth	<28.9	37.2	6/6
Boron	<43.8	100	6/6
Cadmium	0.2	6,440	114/119
Calcium	5	17,600	118/119
Cerium	<1,320	2,270	6/6
Chromium	1	551	115/119
Cobalt	<16.7	19.8	6/6
Copper	1	8,470	119/119
Iron	5	36,400	119/119
Lanthanum	<79.8	182	6/6
Lead	0.5	486	119/119
Magnesium	5	5,800	51/119
Manganese	0.5	6,740	118/119
Mercury	0.1	825	72/119
Molybdenum	<18.5	34.0	6/6
Nickel	1	4,700	117/119
Phosphorous	<1,250	3,080	6/6
Potassium	10	2,060	117/119
Selenium	0.5	135	7/32
Silicon	<244	385	6/6
Silver	1	245	50/113
Sodium	10	1,440	119/119
Strontium	30	175	30/119
Thallium	1	7,460	3/26
Tin	<283	375	6/6
Titanium	<1,170	2,370	6/6
Tungsten	<78.0	96.9	6/6
Uranium	<2,740	4,210	6/6
Vanadium	0.5	207	108/115
Zinc	0.5	895	115/119
Zirconium	<128	425	6/6
Ammonium	0.5	570	13/26
Chloride	1	25.2	18/31
Cyanide	1	1.3	2/26
Fluoride	1	33.1	15/26
Nitrate	1	467	14/26
Sulfate	1	66.3	23/26
Sulfide	1	500	5/26
Benzo[a]pyrene	1	25.0	1/26
Benzo[b]fluoranthene	1	14.0	1/26
Butylbenzyphthalate	1	3.3	1/26
Chrysene	1	12.0	1/26
Trans-1,2-dichloroethylene	0.01	0.04	1/26
Methylene chloride	0.01	0.04	2/26
Tetrachloroethylene	0.01	0.011	4/26
Toluene	0.01	0.02	1/26
Meta-xylene	0.01	0.02	1/26
Ortho-and para-xylene	0.01	0.03	1/26
Radium, pCi/g	NR	11.4	26/26

Source: DOE (1985); Zimmerman and Kossick (1987).
NR = Not reported.

Table 3. Extraction-Procedure Toxicity Results for Process Trench Soils.

Constituents	Regulatory[a] criterion (mg/L)	Mean (mg/L)	Upper 95% confidence limit (mg/L)
Arsenic	5.0	0.10	0.10
Barium	100.0	9.10	11.14
Cadmium	1.0	0.03	0.05
Chromium	5.0	0.02	0.04
Lead	5.0	0.21	0.32
Mercury	0.2	0.04	0.06
Selenium	1.0	0.13	0.13
Silver	5.0	0.01	0.01

Source: Zimmerman and Kossick (1987).

NOTE: One-half the detection limit was substituted for results reported as being below the detection limit; the sample size was six.

[a]WAC 173-303-100(d).

Table 4. Estimated Total Amount of Constituents in the Sediment.

Constituent	Shallow sediments (kg)
Arsenic	2
Cadmium	3
Chromium	341
Copper	2,261
Lead	108
Mercury	12.8
Nickel	578
Silver	74
Uranium	720

Source: Zimmerman and Kossick (1987).

Table 5. Summary of Vadose Zone Soil Quality Data for the Process Trenches.

Parameters detected	Detection limit (mg/kg)	Maximum concentration (mg/kg)	Number of detections	Number of analyses
Aluminum	15	8,470	48	48
Arsenic	0.5	7.13	9	9
Barium	0.6	118	48	48
Beryllium	0.5	4	14	48
Cadmium	0.2	9	48	48
Calcium	5	8,560	48	48
Chromium	1	10	48	48
Copper	1	37	48	48
Iron	5	2,740	48	48
Lead	0.5	5.99	48	48
Manganese	0.5	346	48	48
Mercury	0.1	0.11	2	48
Nickel	1.0	8	48	48
Potassium	10	1,030	48	48
Sodium	10	747	48	48
Strontium	30	31	1	9
Vanadium	0.5	83	48	48
Zinc	0.5	50	48	48
Ammonium	0.5	15	6	9
Chloride	1	10.6	7	9
Fluoride	1	2.02	7	9
Nitrate	1	1.56	2	9
Sulfate	1	21.2	3	9
Lo alpha, pCi/g	NR	10.5	48	48
Gross beta, pCi/g	NR	24.5	48	48
Total radium, pCi/g	NR	1.41	10	10
TOX	1	7.2	28	48
TOC	10	43.7	8	48
Coliform	3.0	110	4	9

Source: Zimmerman and Kossick (1987).
NR = Not reported.
TOC = Total organic carbon.
TOX = Total organic halogen.

Additionally, preliminary ARARs have been identified in the 300-FF-1 Operable Unit Work Plan (DOE-RL 1990). The preliminary discussion of ARARs in the work plan did not address soil contaminant levels because of a lack of regulations and criteria for soil cleanup when the work plan was developed. The EPA has not developed soil cleanup criteria or promulgated soil cleanup standards, except for lead and radium. Ecology has promulgated new regulations for soil cleanup (WAC 173-340) under the *Hazardous Waste Cleanup--Model Toxics Control Act*. The regulation for ERAs (WAC 173-340-430) allows for partial cleanup while not achieving final cleanup standards. This approach is consistent with the EPA in allowing ERAs to attain a reduced standard or level of control before completion of the final remediation of a site. The WAC 173-340-745 establishes the cleanup standards for industrial sites for hazardous substances excluding radioactive materials.

3.1 RADIOACTIVE SOIL CONTAMINANTS

To date, radionuclide-specific ARARs for soil contamination have not been established by the EPA, Ecology, or the U.S. Nuclear Regulatory Commission. The EPA has established cleanup standards for radium-226 in 40 CFR 192 (EPA 1983) for application at uranium mill tailing sites. It would be necessary to establish radioactive contaminant levels in soils if the ERA was a final action, but the ERA is an interim action at a site that will continue to receive effluent from a sewer line with residual contamination present. Therefore, a cleanup level is unpracticable.

Threshold concentrations for radionuclides as established by the DOE (DOE Order 5400.5) (DOE 1990) and Westinghouse Hanford Company (Westinghouse Hanford) (WHC 1988) are the concentrations below which the soil is not considered radioactive waste. Table 6 provides a list of threshold concentrations currently in use at the Hanford Site. For the purposes of the ERA, threshold concentration values will not be used as target maximum contamination levels (MCL) for soils because of the continued use of the trenches and the lack of specific standards for radionuclides in soil which ultimately may be substantially different from Table 6.

3.2 AIRBORNE RADIOACTIVE CONTAMINANTS

The DOE has established allowable radioactive contamination levels for gaseous effluents and airborne contamination (DOE 1990). These levels are known as derived concentration guidelines (DCG). The DCGs were established for use in conducting radiological protection programs at DOE facilities for protection of workers and members of the public. The DCGs are based on a total whole-body exposure limit of 100 mrem/yr or a limiting dose to an organ.

Two exposure pathways for contaminated air have been established: inhalation and immersion in a radioactive cloud. Remedial activities may result in suspension of radioactively contaminated dust or contaminated offgas. The DCGs are applicable and will be used as an action-specific ARAR during the ERA.

Table 6. Threshold Concentration for Radionuclides in Soils.

Radionuclide	Concentration (pCi/g)	Radionuclide	Concentration (pCi/g)
Actinium-277	2	Plutonium-239	75
Americium-241	20	Plutonium-240	75
Antimony-125	5	Plutonium-241	2,500
Bismuth-207	230	Promethium-14	1,700
Carbon-14	870	Radium-226	5
Cerium-144	75	Ruthenium-106	15
Cesium-134	2	Strontium-90	13
Cesium-137	3	Technetium-99	1,750
Cobalt-58	10	Thorium-232	9
Cobalt-60	1	Uranium-232	1
Europium-152	3	Uranium-233	100
Europium-154	3	Uranium-234	100
Europium-155	100	Uranium-235	15
Tritium-3	35,000	Uranium-238	50
Iodine-129	50		
Iron-55	1		
Nickel-63	3,900		
Plutonium-238	75		

Source: WHC-CM-7-5 (WHC 1988).

A preliminary safety assessment was performed with worst-case assumptions to evaluate the proposed activity for offsite releases. The assessment concludes that routine dust control measures (application of water) as practiced during excavation and transportation activities would be adequate to greatly reduce potential exposures to the nearest offsite individual.

3.3 RADIOACTIVE CONTAMINANTS IN WATER

Contaminated liquid streams may be generated as a result of remedial activities. The DOE has established DCGs for contaminated water that are based on a total whole-body exposure of 100 mrem/yr or a limiting dose to an organ. The DCGs for water are applicable and will be used as an action-specific ARAR during remediation. The allowable concentration of radioactive contaminants in liquid effluents is one times the respective DCGs.

Because the trenches will remain active during and after the removal activities, the estimated small volume of decontaminated water will be directed into the trench in use at the time of decommissioning to minimize waste generation.

3.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENT GOAL FOR SOILS

There are no specific federal cleanup standards or chemical-specific ARARs for compounds in soils (hazardous or radionuclide). The new state soil cleanup standards (WAC 173-340) have just been issued. Soil cleanup standards established pursuant to the state *Hazardous Waste Cleanup--Model Toxics Control Act* may be ARARs for final cleanup, but would not serve as ARARs at the expedited response stage. The ERA objective is not based on attaining a specified numeric cleanup level for known contaminants because of the limitations in performing removal.

The ERA consists of removing contaminants from the active trench areas and consolidating and isolating them in a portion of the trenches. This removal of an intermediate source of contamination is a first step in a total remediation action that will occur in the future. The continued use of the trenches for effluent discharge until early to mid-1995 is necessary to support the 300 Area; therefore, strict compliance with a specified cleanup level is not practicable. Also isolation of contaminants from the effluent is a good waste management practice to reduce potential environmental threats.

4.0 EVALUATION OF REMEDIAL TECHNOLOGIES FOR CONTAMINATED SOIL

4.1 GENERAL EVALUATION PROCESS

After receiving direction to develop the information necessary to prepare an ERA proposal, Westinghouse Hanford evaluated appropriate and acceptable technologies for implementation of the ERA in a timely manner. The 316-5 Process Trench ERA has been categorized as a non-time-critical response action by the EPA. Therefore, an EE/CA must be developed (FR Vol. 53, No. 245/ Dec. 21. 1988 page 514409; Title 40, Code of Federal Regulations, Subpart E 300.415). The EE/CA is a focused feasibility study that considers ARARs, protection of the environment and human health, timeliness, effectiveness, and cost of the technology. The process of selecting a preferred alternative is conducted in a two-phased approach. The first phase is initial screening of potential technologies against the criteria of timeliness and environmental protection. Technologies and alternatives that pass the screening are then evaluated against additional criteria to select a preferred method to perform the ERA. The second set of criteria includes technical feasibility and reliability, administrative and managerial feasibility, and cost.

Technical feasibility and reliability eliminates innovative, conceptual, and emerging technologies that require further development and presently do not have a proven record for the application under consideration. This criterion also includes the degree of environmental protection and potential for minimizing impact of the record of decision (ROD).

Administrative and managerial feasibility focuses on the ability to implement a technology and includes equipment, design, permits, and public acceptance.

The cost criterion, while an important factor in the overall evaluation, is not the most significant criterion for selecting the preferred technology. If the cost of an alternative remains below the $2 million limit the EPA has set for EPA-funded ERAs, and the DOE limit for *National Environmental Policy Act of 1969* (NEPA) requirements for removal activities [categorical exclusion (CX)] at DOE CERCLA sites, the alternative is given more consideration than the more expensive option.

4.2 EVALUATION OBJECTIVE

The purpose of evaluating potential ERA technologies is to select the preferred method(s) to address the contaminants in the trench sediments. The potential to reduce the threat to the environment from the contaminants warrants performing an ERA. As presented and discussed with the EPA and Ecology, the specific objective of the preferred ERA method will include reduction of the contamination source. Thus, the potential exists for contaminants to migrate from the trenches through the soil column into groundwater and subsequently into the Columbia River. The EPA and Ecology have directed that any technology that may be considered a final treatment for consideration by the ROD for the operable unit should be removed from consideration. Any technology that appears to be a final remediation should be considered in the ROD for the 300-FF-1 operable unit.

Selection of an acceptable method to perform the ERA will be conducted in the following sequence. Initially, potential technologies are identified, followed by preliminary screening, preparation of an EE/CA, and selection of the preferred method.

The following are descriptions of the results of the approach used for the ERA.

4.3 PRELIMINARY SCREENING OF AVAILABLE TECHNOLOGIES

A number of technologies have been developed and used to remediate contaminated soil. A limited number of technologies exist for use at sites that contain radiological and hazardous contaminants. A summary of technologies identified is located in Table 7. Screening before performing the EE/CA was done to eliminate technologies that were not considered applicable for the process trenches and to provide a limited set of

Table 7. Potential Viable Technologies for Remediation of Contaminated Soil.

Remedial technology	Process description	Comments	Retain for further evaluation[a]
1. CONTAINMENT			
a. Capping	Placement and compaction of impermeable materials over the contaminated area.	The facility is currently active, and many structures are present; therefore, a continuous impervious cap will interfere with operations.	No
		Interim cover	Yes
b. Stabilization/ Solidification	Processes reduce the solubility, chemical reactivity, or movement by physical entrapment.	Interferes with continued use of trenches.	No
2. COLLECTION			
Excavation and Removal	Removal of soil by common construction equipment.	Offsite disposal of soil restricted. Consolidation possible.	Yes
3. TREATMENT			
a. Biological Treatment	Microorganisms metabolize hazardous organic compounds rendering them nonhazardous.	Not feasible for the timeframe for an ERA. Interfere with trench operation.	No
b. Physical Treatment			No
Physical Separation (soil washing)	Removal of contaminants by screening, scrubbing, and washing.	Considered a final treatment to be considered in record of decision.	No
Thermal Treatment (incineration/ vitrification)	Heat is applied to destroy or immobilize contaminants.	Not effective for inorganics or radionuclides in soil. Final treatment.	No
c. Chemical Treatment			
Oxidation/Reduction	Addition of reagents to change oxidation state and reduce or eliminate toxicity.	Most appropriate for inorganic wastes. Interferes with operations.	No
Precipitation	Metal contaminants are removed by precipitation.	Contaminants deposited by this process. Application to soil at active operation questionable.	No
Ion Exchange	Ions are exchanged for similarly charged ions.	Ion exchange best used for removal of inorganic ions from solution.	No

[a]Remedial technologies not retained for the expedited response action may be given further consideration during the remedial investigation/feasibility study process.

technologies for consideration in the EE/CA. The initial screening used best engineering judgment in conjunction with site-specific characteristics to arrive at acceptable technologies. The following sections provide brief descriptions of technologies considered for containment, collection, and treatment.

4.3.1 Containment

Containment involves isolating the contaminants from the environment to prevent further migration and subsequent threat to the public and environment. Containment may be accomplished in a variety of ways, two of which were considered for use during this ERA. The following sections provide descriptions of the methods considered.

4.3.1.1 Capping. Capping is soil covering applied over contaminated materials for long-term or interim protection depending on the design of the cap. Capping is relatively easy to install, is low cost, and has been used at radioactive sites for many years. The technology involves construction of a site barrier that provides adequate thickness and impermeability to minimize migration and attenuate radiation. In the case of the process trenches, a RCRA-compliant cover constructed to specifications for a permanent landfill would be less than desirable. The construction of an interim cover containing a minimum of sand and fine material will reduce and eliminate potential air pathway migration from the site. The cover does not need to provide the impermeable layer to prevent infiltration, because the rainfall at the site, while concentrated in a few short periods during the year, will not create a mechanism to drive the contaminants toward groundwater to be differentiated from the continued operation of the trenches. The process trenches will remain active with reduced flows until 1995; thus, use of this technology alone is not considered applicable for an interim action.

4.3.1.2 Land Encapsulation. Land encapsulation is a variation of the barrier used in the capping described in Section 4.3.1.1, with the barrier applied to material that has been excavated and redeposited in a location with complete barrier protection (e.g., liners). This technology is used for both permanent and temporary applications. In addition, it is used at both hazardous and radioactive waste sites. The advantages of the technology are that the wastes are removed from the affected area and redeposited in a compliant location and that the technology is proven. The ERA does not intend to remove the contaminants from the immediate area of the trenches; thus, land encapsulation is not considered viable for application as an interim action.

4.3.1.3 Stabilization and Solidification. Stabilization and solidification involves the addition of solidification agents to the trench soil and mixing to immobilize the contaminants. The technology is applicable to in situ or excavated soils. For the process trenches, the in situ option was considered and dismissed as not applicable. The presence of hazardous chemicals may interfere with the stabilization as would the continued discharge of effluent to the trenches.

4.3.2 Collection/Excavation/Removal

The excavation technology uses standard earthmoving equipment and methods to remove contaminated sediments. The material would be transported to an area for interim stabilization to reduce potential migration of the contaminants until a final remediation for the liquid disposal sites in the 300-FF-1 operable unit is finalized by the ROD. The technology is easily implemented and previously has been demonstrated on the Hanford Site to mitigate radionuclide migration.

The excavation and removal technology uses standard earthmoving equipment and methods to remove the bottom sediments and soil containing the majority of the contaminants. The material would be transported to an area for interim stabilization to prevent migration of the contaminants until the ROD is finalized for the operable unit in 1995.

4.3.3 Treatment

Treatment technologies considered for use are described briefly in the following subsections.

4.3.3.1 Biotreatment. Biological treatment of hazardous materials, specifically oil, has been recognized as a viable technology for many years. The technology involves the use of microorganisms to metabolize hazardous organic compounds to obtain nonhazardous compounds. The application to inorganic compounds and radionuclides is not developed to the extent that the technology is feasible to use for the ERA. Additionally, the continued discharge of effluent to the trenches may interfere with the technology and the technology may interfere with the operation of the trenches. Accordingly, the technology was not considered viable.

4.3.3.2 Physical Treatment. Two physical treatment technologies described in the following subsection were considered for the ERA.

4.3.3.2.1 Soil Washing. Physical separation can be used when the contaminants are expected to reside in a specific portion of the sediments. The technology uses readily available equipment from the mineral processing industry to screen, classify, and concentrate contaminants in a specific soil fraction (fine particles). This is a mechanical process based on particle size, density, or settling rates in fluids (e.g., water). The technology will only succeed if the contaminants are confined to a specific soil fraction that can be separated from the clean portion. The technology depends on excavation of the soil and requires disposal of the residual contaminants. An option of the technology is to perform soil washing with water or other extractants to remove the contaminants. The process will wash contaminants free of the coarser soil fraction, concentrating the insoluble contaminants in the fine fraction with the soluble contaminants in the extractant. The physical separation technology is a major part of the soil washing technology. The residual concentrated waste stream will require further treatment with other technologies or disposal.

4.3.3.2.2 **Thermal**. Thermal destruction of contaminants through application of heat to excavated sediments (incineration) or to the contaminants in situ (vitrification) were considered as two options of physical treatment. Incineration would destroy any residual organics in the sediments but would provide little or no benefit for immobilizing or reducing the toxicity of the inorganic metals and radionuclides. In situ vitrification is a new and emerging technology that could immobilize the contaminants in place by melting the soil into a glass. The application was not considered viable for use in an area of active liquid discharge. Accordingly, thermal treatment was not considered applicable to the ERA.

4.3.3.3 **Chemical Treatment**. Chemical treatment is a separation technology that uses chemicals to extract contaminants from sediments. Chemicals are mixed with the contaminated sediments to obtain one or more fractions with the concentrated contaminants and a clean fraction that may contain traces of unextractable contaminants. The extractant contains soluble contaminants in addition to any naturally occurring materials removed during the process. The contaminants can be removed selectively from the extractant through precipitation, ion exchange, or filtration. The extractant also may be treated by thermal methods or oxidation/reduction to reduce or eliminate toxicity. The technology has the potential for application in situ or on excavated soils in conjunction with the soil washing physical treatment technology. The use of this technology was not considered viable for an area with continued liquid discharge.

4.3.4 Summary of Technology Selection

The most viable technology identified during the screening process was the excavation and removal technology. The technology alone does not provide adequate remediation of the contaminants for the ERA. When considered with a modification of the capping technology, potential remedial alternatives can be assembled as described in Section 5.0.

5.0 REMEDIAL ALTERNATIVES

The ERA guidance directs consideration of the no action alternative in addition to the other alternatives proposed for the EE/CA. The viable technologies profiled in the previous section can be incorporated into a response action that will address the contaminants of concern in the process trenches. While no technology can stand alone as the solution for the ERA, one offers an expedient method to handle the situation.

The sediments within the process trenches are contaminated with low levels of inorganic compounds and radionuclides. The sediments are considered to be a RCRA waste because the location is an interim status facility. Accordingly, the waste must be managed at a compliant facility. The CERCLA and RCRA regulations appear to allow for consolidation of wastes within the permitted area of the trenches or in the operable unit, because there is not an expansion of waste activities. Therefore, ERA alternatives were developed using the technology identified in the screening process, which provides a reasonable approach to removing and consolidating contaminated sediments from the active environment of the process trenches. Continued use of the trenches is the limiting factor in determining alternatives for evaluation by the EE/CA. Historical sampling data (Table 8) indicate that a majority of the contaminants are located on the bottom surface of each trench bottom with the contaminant concentrations decreasing within the first 0.5 m (18 in.) beneath the trench bottom. The extent of contaminants also decreases with distance from the weir box with a major portion of the contaminants located in the first 152 to 213 m (500 to 700 ft) of trench. Discussions with a participant in the sampling also have verified the occurrence of visible contaminated material in the trenches. The contamination on the side walls is expected to be less than that in the bottom sediments. The primary source of contaminants (fuel fabrication) was removed when the fuel fabrication process activities were eliminated in 1987. Assuming the length of each trench is excavated to an average depth of 0.6 m (2 ft) (6 in. below sample data) to remove a large portion of the contaminants, about 1,900 m^3 (2,500 bank yd^3) of sediment will be removed and consolidated.

The alternatives considered are described in the following sections.

Table 8. Concentration of Constituents in Sediments (parts per million).

Constituents	Shallow samples						Well samples	
	Loose		Shallow (4 in.)		Deep (18 in.)			
	Average	Peak	Average	Peak	Average	Peak	Average	Peak
Arsenic	1.5	10	0.9	6	1	14	0.6	7
Cadmium	2.4	20	1.8	5.4	1.3	2.9	0.49	0.9
Chromium	274	551	59	319	30	131	6	10
Copper	3550	7320	1109	8470	522	2230	18	42
Lead	205	486	33	230	21	86	3	7
Mercury	15	58	6	69	2	21	0	0.1
Nickel	529	1550	306	4700	95	1030	5	11
Silver	137	405	35	245	12	110	<1	<1
Uranium	7400	20400	1200	6900	3400	27700	7.3	15.5

Source: Zimmerman and Kossick (1987).

5.1 NO ACTION ALTERNATIVE

The no action alternative would leave the contaminants in the trench sediments unremediated and would not attempt to mitigate the potential migration pathway to groundwater. The option would not satisfy the ERA objective of reducing potential threats to the environment and any associated risks with migration of the contaminants.

5.2 DISPOSAL AT CENTRAL WASTE COMPLEX

Disposal at the central waste complex involves excavation of the contaminated sediments from each trench, placement of sediments in 208-L (55-gal) drums with absorbent/stabilizing agents, and transport of the drums to the central waste complex for storage until a permitted mixed waste disposal facility is available. The estimated volume of material to be excavated is 1,900 m^3 (2,500 bank yd^3). Assuming a swell factor of 30%, the disposal volume is about 2,500 m^3 (3,250 yd^3). If the average drum contains 0.14 m^3 (5 ft^3) of sediment, approximately 17,600 drums would be needed for containment and transportation to a storage/disposal facility. The excavated sediments will be mixed with absorbent and/or stabilization agents to comply with waste acceptance criteria. This alternative requires a system capable of mixing and dispensing the treated sediments into individual drums for transport to the central waste complex. A representative number of drums (i.e., 10%) will be sampled and analyzed for waste characterization before shipment. The alternative requires a temporary storage area to hold drums until the laboratory results are available. This option will use the same basic excavation method as described in Section 5.3 for removal of sediments from each trench.

5.3 INTERIM STABILIZATION IN NORTH PROCESS POND

Following site preparation activities, removal of the contaminated material will commence. Excavation will begin in the trench that currently is not in use and has had sufficient time to drain. If, as startup time approaches, one trench is nearing its normal switchover time, it may be switched then to allow the maximum time possible for material removal before the operating trench again reaches its capacity. This will be determined more precisely as startup time approaches.

Using a large backhoe (e.g., FMC-Link Belt*), the contaminated sediments will be excavated starting at the end of the trench nearest the outfall. The sediments will be removed from the bottom of the trench and part way up the sides. The material will be loaded into dump trucks stationed near the backhoe along the trench bank. To facilitate decontamination of equipment upon completion of use, the dump truck beds may be lined with protective material (e.g., fiber glass or commercially available bed liner). The trucks will be filled short of capacity to reduce the potential for spillage as the material is hauled to the consolidation area. Two circular routes will be established for the trucks, one on the west side and one on the east side of the trenches. This will control the flow of traffic in a safe manner, with full trucks using one section and empty trucks returning for refill on the other. It is expected that sections of fence on the west side of the trenches and a section of fence between the process trenches and the process pond will be removed temporarily to establish the routes. A temporary haul road will require construction to provide truck access to the bottom of the process pond. A water truck also will be operating as part of the fleet, spraying the haul road and consolidation area to control dust. A layer of clean material,

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*FMC-Link Belt is a trademark of the FMC Corporation.

obtained from a nearby borrow area, may be placed over the contaminated sediments when needed for dust control; but application of water will be the primary method of dust control for the ERA.

As the excavation progresses down the trench, the recently excavated portion will be monitored with field instruments (e.g., radiation detection, x-ray fluorescence) to verify the level of contaminant removal.

Once the soil removal is complete in the first trench, the areas where sediments were removed will be graded or refilled as necessary to reduce or prevent erosion and sloughing of the banks and/or undermining of the outfall apron once water is reintroduced.

Following removal activities in the first ditch and before starting in the second ditch, the sediments in the head-end weir box will be flushed out into the active trench to ensure that the trenches receive minimal residual contaminants following the removal activities. After the flushing is performed, the effluent will be switched to the clean trench. Removal operations will be suspended until the sediments in the second trench have had sufficient time to drain. Operations in the second trench will proceed in a manner similar to the first trench.

After the second trench is complete, final layers of cover material will be placed over the consolidated material in the process pond. Interim stabilization of the stockpiled material will consist of grading and compacting material followed by application of clean fill. The fill material will be obtained from a location on the Hanford Site within reasonable haul distance to the process trenches. About 0.3 to 0.5 m (12 to 18 in.) of coarse aggregate-type material will be deposited at the edge of the stockpile and spread over the area by a suitable piece of equipment (e.g., dozer). This method of application will provide a clean surface to work from and will eliminate the potential for contaminating the equipment. This may be difficult to attain in the process pond because the surface and underground contamination appears to be greater than that of the process trenches. Soil sterilization agents or herbicides will be applied to reduce the potential for vegetation growth.

A desirable source of water for dust control is the effluent from the weir box located at the south end of the trenches. The effluent is readily available and is not expected to increase contamination at the process trenches. If this supply is unavailable, water will be transported from the 300 Area or other areas as needed. After completion of removal activities and before final interim stabilization, the haul routes will be radiologically surveyed to detect the presence of additional contaminants (uranium is the primary contaminant). If additional contaminants are detected, equipment will be available to consolidate this material with the trench sediments or provide a clean fill cover.

5.4 INTERIM STABILIZATION IN PROCESS TRENCHES

The alternative (interim stabilization in process trenches) will excavate and stabilize (for an interim period) the contaminated sediments as described in Section 5.3 with the following differences performed to provide isolation of the sediments. The fence between the process pond and process trenches will not require temporary removal. It is expected that sections of fence on the west side of the trenches will be removed temporarily to establish the routes. The east side appears to have adequate space. The sediments will be consolidated in the overflow area at the northwest corner of the site. Once the overflow area is filled with sediments, the material will be consolidated in the northern end of the west trench and the east trench as needed. It is estimated that the northern 65 m (200 ft) of the west trench should be adequate for material consolidation. To minimize the amount of trench area removed from service because of consolidation, the maximum amount of sediments will be placed in the overflow area. When the sediment consolidation in the trench is complete, a clean fill berm will be placed between the sediments and the active trench area. The trench bottom will be graded to prevent erosion and sloughing of the banks or undermining of the outfall apron when effluent is reintroduced to the trench.

Once the soil removal is complete in the first trench, a clean soil barrier will be placed between the consolidated material (if any is present) and that section of trench that will remain operational. In addition, the areas where contamination was removed will be refilled with clean material if necessary to prevent erosion and sloughing of the banks or undermining of the outfall apron once water is reintroduced.

To minimize the amount of trench space taken out of service by consolidation, as much contaminated soil as possible will be placed into the former overflow area at the northwest end of the trenches. The material will be placed in this area until it reaches a level about 0.6 m (2 ft) lower than the surrounding terrain. Once this level is reached, the material will be placed into the northern end of the trench. Material will be placed into the trench to a level about equal to the top of the center dike.

6.0 ENGINEERING EVALUATION AND COST ANALYSIS

The EE/CA involves a two-step process that focuses on each of the alternatives described in Section 5.0 of this proposal. The first step is the application of screening factors to the action and no action alternatives. The two screening factors are (1) timeliness and (2) protection of the environment and public health. The alternatives that satisfy the initial screening factors are then subjected to selection criteria in the second step of the process. There are three selection criteria: (1) reliability/ technical feasibility, (2) administrative/managerial feasibility, and (3) reasonable cost. The alternative that passes the screening factors and ranks highest among the selection criteria becomes the preferred remedial alternative for the ERA.

6.1 SCREENING FACTOR EVALUATION

Screening of the alternatives based on timeliness involves considering whether the option is feasible within the 1-yr timeframe of this ERA. Screening for protection of public health and environment is based on the *National Oil and Hazardous Substances Pollution Contingency Plan* (EPA 1985) requirement to eliminate options that do not meet applicable or relevant and appropriate federal requirements. Because the trenches are active and expected to remain so for the next few years, the protection consideration excludes workers employed by the DOE (including contractors) and those entering the site to conduct business with the DOE and contractors. These people are the responsibility of the DOE and contractors under requirements of federal and state occupational health laws.

The alternatives were evaluated for these two screening factors. The evaluation is presented below and summarized in Table 9.

Table 9. Evaluation of Remedial Alternatives for Engineering Evaluation and Cost Analysis Screening Factors.

Alternative	Timeliness	Screening factors protect public health	Protect environment	Retained for evaluation
No Action	No implementation required	Public health risks not reduced or eliminated.	Potential contaminant migration offsite is uncontrolled. Environmental risk not reduced or eliminated.	No
Excavate and transport to central waste complex	Can be implemented within 1 yr	Public health risks associated with waste reduced, not eliminated.	Intermediate source of contamination reduced. Potential contaminant migration is reduced.	Yes
Excavate and stabilize in North Pond	Can be implemented within 1 yr	Public health risks associated with waste reduced, not eliminated.	Intermediate source of contamination reduced. Potential contaminant migration is reduced.	Yes
Excavate and stabilize in trench area	Can be implemented within 1 yr	Public health risks associated with waste reduced, not eliminated.	Intermediate source of contamination reduced. Potential contaminant migration is reduced.	Yes

6.1.1 No Action

The no action alternative requires no further effort; therefore, it meets the timeliness factor. However, the no action alternative would not provide full protection of public health and the environment. The public health and environmental risks associated with the contamination at the Hanford Site have been identified as generally acceptable by the EPA. Implementation of the no action alternative provides no remediation of the contaminants onsite and no control of contaminant migration offsite. The risks posed by site contaminants to public health and the environment are not reduced or eliminated. Therefore, selection of the no action alternative is unacceptable for the ERA, and it is not retained for future evaluation.

6.1.2 Disposal at Central Waste Complex

This alternative can be initiated within 1 yr and will reduce both potential environmental and public health threats through removal of an intermediate source of contaminants from the driving head of the effluent.

6.1.3 Interim Stabilization in North Process Pond

This alternative can be initiated within 1 yr and will reduce both potential environmental and public health threats through removal of an intermediate source of contaminants from the active portion of each trench. The alternative does not eliminate all the contaminants, only those accessible in the loose material in the trench bottom and the contaminants in the 0.6 m (2 ft) of sediment beneath the trench bottom. Continued use of the trenches may produce accumulation of residual contaminants from the process sewer, but the primary activity that generated the contaminants is no longer operating. Therefore, a reduction in the overall potential environmental threat is achieved. This alternative, while satisfying the criteria for protection of the environment, places the sediments closer to the Columbia River. Technically this should not be a problem because the potential for the material to selectively migrate offsite is minimal to nonexistent.

6.1.4 Interim Stabilization in Process Trenches

Interim stabilization in process trenches can be initiated within 1 yr and will reduce both potential environmental and public health threats through removal of an intermediate source of contaminants from the driving head of the effluent. This alternative does not eliminate all the contaminants, only those accessible in the loose material in the trench bottom and the contaminants in the 0.6 m (2 ft) of sediment beneath the trench bottom. Continued use of the trenches may produce accumulation of residual contaminants from the process sewer, but the primary activity that generated the contaminants is no longer operating. Therefore, a reduction in overall potential environmental threat is achieved.

6.2 SELECTION CRITERIA EVALUATION

Three alternatives met the screening factors of the EE/CA and were considered for further evaluation using the three general categories of selection criteria previously described in Section 6.0. The screening criteria evaluation is presented below.

6.2.1 Reliability/Technical Feasibility

The alternatives were analyzed in terms of the level of reliability and the technical feasibility of implementation. The reliability/technical feasibility criterion includes evaluating the technology, the effectiveness of the alternative in achieving the goal of this ERA, the useful life of the alternative, the operation and maintenance requirements, the constructability, the time required, and the environmental impacts as a result of implementation.

6.2.1.1 Disposal at Central Waste Complex. Disposal at the central waste complex will effectively remove the intermediate source of contaminants from the process trenches by placing the sediments in appropriate packages with stabilization agents and transporting them to the waste facility. The reduction in source will not completely eliminate the environmental threat at the trenches but will reduce the potential for contaminants to migrate to groundwater. The operation and time requirements to perform this alternative are substantial in comparison to the other alternatives. If placed in 208-L (55-gal) drums, 17,600 drums and more than 350 work days will be required to complete drum filling (assuming 50 drums per day). Maintaining the excavation and hauling equipment at the trenches for the length of the packaging process will impact site resources. The time required to remove and package the sediments will interfere with routine operations at the trenches.

The environmental impact during operation of excavation and drum filling is estimated to be minimal, with fugitive dust emissions the primary concern. A preliminary safety assessment classified the proposed ERA excavation activity as a low hazard activity that presents minor onsite and negligible offsite impacts to individuals and/or the environment. The assessment identified fugitive dust as the potential pathway for contaminant migration during removal activities. Routine dust control methods for earthmoving activities (application of water) can be employed to reduce and eliminate to the extent possible fugitive dust emissions. An ambient air monitoring station is located at the southwest corner of the process trenches; additional temporary monitoring station(s) or acceptable equivalent sampling can be provided to evaluate the effectiveness of dust control during the ERA. Safety assessment constraints resulted in consideration of only impacts on excavation-related activities. A short-term, negative impact associated with the alternative is the storage of 17,600 drums of waste at the central waste complex. In addition, a temporary holding area at the trenches and the transporting of waste drums create a potential for an additional impact to the environment.

This alternative is a proven, effective demonstrated technology with a useful life of that of the package at a surface storage facility and increased life expectancy with disposal of the packages in a permitted disposal facility on the Hanford Site.

6.2.1.2 Interim Stabilization in North Process Pond. This alternative will effectively remove the intermediate source of contaminants from the process trenches by excavating the sediments and isolating the sediments from the effluent. The operation and maintenance for the alternative is low with reapplication of sterilant and repair of the interim cover performed as needed. The reduction in source will not completely eliminate the environmental threat at the trenches, but does reduce the potential for contaminants to be available to migrate to groundwater.

The environmental impact during excavation, transport, and interim stabilization will be from potential fugitive dust if dust control measures are not instituted. A preliminary safety assessment classified the proposed ERA excavation activity as a low hazard activity that will present minor onsite and negligible offsite impacts to individuals and/or the environment. The assessment identified fugitive dust as the potential pathway for contaminant migration during removal activities. Routine dust control methods for earthmoving activities (application of water) can be employed to reduce and eliminate to the extent possible fugitive dust emissions. An ambient air monitoring station is located at the southwest corner of the process trenches; additional temporary monitoring station(s) or acceptable equivalent sampling can be provided to evaluate the effectiveness of dust control during the ERA. The placement of the sediments in the process pond was considered by the safety assessment and dismissed from consideration because of the following.

- Source of contaminants in proximity to the general public would increase (access to west bank of the Columbia River).
- Additional haul distance would generate more potential fugitive dust.
- Increased work area associated with the storage pile provides another potential for increased fugitive dust generation.

The impact to the immediate workers performing the activity will be considered in the safety documents required by the ERA (e.g., Hazardous Waste Operation Permit, Radiation Work Permit). The impact to other site employees and the general public was considered in the safety assessment. The short- and long-term exposure to the general public from dust emissions should be negligible with implementation of dust control measures during excavation and interim stabilization.

This alternative is an effective demonstrated technology and will have a life in excess of the period of time before final remediation will be initiated.

6.2.1.3 Interim Stabilization in Process Trenches. Interim stabilization in process trenches will effectively remove the intermediate source of contaminants from the process trenches by excavating the sediments and isolating the sediments from the effluent. The operation and maintenance for the alternative is low with annual reapplication of sterilant to the interim cover and repair of the cover as needed. The reduction in source will not completely eliminate the potential environmental threat, but does reduce contaminants available to migrate to groundwater. The excavation and removal of the sediments will require temporary consolidation and application of an interim cover. The operational and construction-type activities are routine and can be instituted easily with plant forces trained to operate the equipment necessary to complete the ERA.

A preliminary safety assessment has identified dust control as the primary potential source of contaminant migration during removal activities. Routine dust control methods for earthmoving activities will be employed to reduce and eliminate to the extent possible fugitive dust emissions. Ambient air monitoring is located at the southwest corner of the process trenches; additional temporary monitoring station(s) or equivalent sampling will be provided to evaluate the effectiveness of dust control during the ERA.

The environmental impact during excavation, transport, and interim stabilization may be from potential fugitive dust if dust control measures are not instituted. The short-term impact of direct contact with the material could affect the workers performing the activity and could adversely impact other site employees or the general public. The long-term exposure to the general public from dust emissions could be minimal to nonexistent with adequate dust control measures and interim stabilization. The ERA is a temporary action before final remediation. Health and safety risks will be reduced through implementation of the health and safety plan, including a Hazardous Waste Operation Permit and Radiation Work Permit.

This alternative is an effective demonstrated technology and will have a life in excess of the period of time before final remediation will be initiated.

6.2.2 Administrative/Managerial Feasibility

This section describes the administrative and managerial feasibility implications of all the alternatives.

This criterion involves considering the implications of administrative and managerial requirements (e.g., permit requirements, transportation needs, public concerns, and nontechnical aspects of the alternative implementation). The ERA proposal will be reviewed by the EPA and Ecology and will undergo a 30-day public comment period. This will provide consideration of public concerns input to the ERA. The ERA is conducted as a CERCLA removal action, and no permits are required to perform the response action. The local government will be informed of the action and the potential for fugitive dust emissions as a courtesy. The DOE requires NEPA documentation to perform the removal activities under CERCLA. The specific NEPA document is referred to as a CX as proposed in 29 CFR 1910 (OSHA 1986). The CX is applicable to environmental restoration and waste management and specifically for a removal action for excavation or consolidation of contaminated soil from areas not receiving contaminated waste water. The alternatives may eliminate uncontrolled use of the equipment if decontamination cannot be performed to satisfy the Operational Health Physics groups.

The alternatives will generate noise and small amounts of fugitive dust during removal, packaging, and transportation of the contaminated sediments. These items may be a nuisance for some site workers who are not directly associated with the ERA, but would be a negligible nuisance impact to the general public.

6.2.2.1 Disposal at Central Waste Complex. With this alternative, the regulators may be concerned that the removal and storage/disposal at the waste complex facility is more of a final remediation action and may have an adverse impact on the ROD for the 300-FF-1 operable unit.

The resource requirements to perform the alternative will have a substantial impact on equipment availability for use at other projects on the Hanford Site because of the need for the heavy equipment to be located at the trenches for more than 350 work days. This will create scheduling delays or require an unnecessary expenditure to obtain replacement equipment capabilities.

6.2.2.2 Interim Stabilization in North Process Pond. This alternative may require the EPA to determine and issue a waiver or variance, if necessary, for placing the contaminated sediments in the inactive process pond. The process pond is an integral part of the operable unit remedial investigation. Placing the additional sediments in the pond would increase the amount of contaminants in proximity to the Columbia River and raise public concern, but also would impact, to a small extent, planned remedial investigation of the process pond.

6.2.2.3 Interim Stabilization in Process Trenches. The alternative will create minor administrative concerns (short-term disruption of routine operation of the trenches and shortening the trenches) and minimal environmental impacts. Placing the contaminated material in the northern end of the trenches may impact one vertical soil boring and two horizontal borings as proposed in the 300-FF-1 Work Plan (DOE-RL 1990). The proposed boring can be relocated and still provide desired information for the RI/FS.

6.2.3 Reasonable Cost

The reasonable cost criterion was used to evaluate the relative costs of each alternative and does not include engineering or administrative expenditures incurred before implementation of an alternative. The major expense for the two alternatives involving excavation and interim stabilization is the labor costs to perform the work. For the purposes of the comparison, these two alternatives are assumed to have nearly identical labor costs after considering the two locations for consolidation of the sediments. The alternative for shipping the sediment to the central waste complex is excessively costly with an estimated cost of more than $50 million. The excessive cost for that alternative, if selected and initiated, would severely impact many other restoration activities at the Hanford Site. The estimated overall cost for the remaining two ERA alternatives is between $1.4 and $1.6 million including contingencies. The estimated costs for the removal and stabilization or disposal of the sediments are given below. Weather conditions or resource restrictions are expected to be the primary sources for delays in completion of the ERA waste consolidation activities.

6.2.3.1 Expedited Response Action Estimated Cost for Disposal at Central Waste Complex Alternative. The cost for this alternative was based on the following assumptions.

- Excavated volume of material is 2,500 m^3 (3,250 yd^3).
- Each 208-L drum contains 0.15 cm (5 ft^3) of sediment with the remaining volume including stabilization agent.
- Alternative requires 17,600 drums (208-L) at $80 each.
- Disposal cost per drum for mixed waste is $1,900 each.
- Ten percent of drums are analyzed for characterization at $2,000 each.
- Fifty drums per day are processed requiring a minimum of 351 work days.
- Average hourly rate including overhead is $60/h.
- Annual maintenance and operation costs for disposal are included in the disposal cost.
- Equipment is available onsite for mixing sediments and stabilization agent.

Implementation	
Labor	$3,400,000
Materials and Supplies	$1,800,000
Waste Characterization	$33,000,000
Engineering Support and Administration	$2,500,000
Subtotal	$44,200,000
30% Contingency	$13,260,000
Total	$57,460,000

6.2.3.2 Expedited Response Action Estimated Cost for Process Pond Alternative. The following estimated cost for this alternative is for the costs associated with site preparation, excavation of sediments, interim stabilization, and restoring the location to conditions similar to those before the ERA implementation. The estimate does not include administrative and engineering costs incurred before implementation of the ERA.

The costs were generated based on the following assumptions.

- Mobilization, demobilization, excavation, and interim stabilization will require 60 work days including down time for weather, resource restrictions, or other adverse conditions.
- Average hourly rate including overhead is $60/h for a minimum of 21 individuals.
- Materials and supplies include replacement fencing and posts, fuel and maintenance for equipment, protective clothing, and other items necessary to complete the activity.
- Earthmoving equipment is released for uncontrolled use at completion of the ERA.
- Annual operation and maintenance will require only application of sterilant or herbicides one to three times per year for 5 yr before final remediation is initiated.

Implementation	
Labor	$346,000
Materials and Supplies	$80,000
Engineering and Administration	$260,000
Subtotal	$686,000
30% Contingency	$206,000
Subtotal with Contingency	$892,000
Annual Operation/Maintenance	$10,000
Total	$902,000

6.2.3.3 Expedited Response Action Estimated Cost for Process Trench Alternative. The following estimated cost for this alternative is for the costs associated with site preparation, excavation of sediments, interim stabilization, and restoring the location to conditions similar to those before the ERA implementation. The estimate does not include administrative and engineering costs incurred before implementation of the ERA.

The costs were generated based on the following.

- Mobilization, demobilization, excavation, and interim stabilization will require 60 work days including down time for weather, resource restrictions, or other adverse conditions.
- Average hourly rate including overhead is $60/h for a minimum of 21 individuals.

- Materials and supplies include replacement fencing and posts, fuel and maintenance for equipment, protective clothing, and other items necessary to complete the activity.
- Earthmoving equipment is released for uncontrolled use at completion of the ERA.
- Annual operation and maintenance will require only application of sterilant of herbicides one to three times per year for 5 yr before final remediation is initiated.

Implementation	
Labor	$346,000
Materials and Supplies	$80,000
Engineering and Administration	$260,000
Subtotal	$686,000
30% Contingency	$206,000
Subtotal with Contingency	$892,000
Annual Operation/Maintenance	$10,000
Total	$902,000

6.3 PREFERRED REMEDIAL ALTERNATIVE

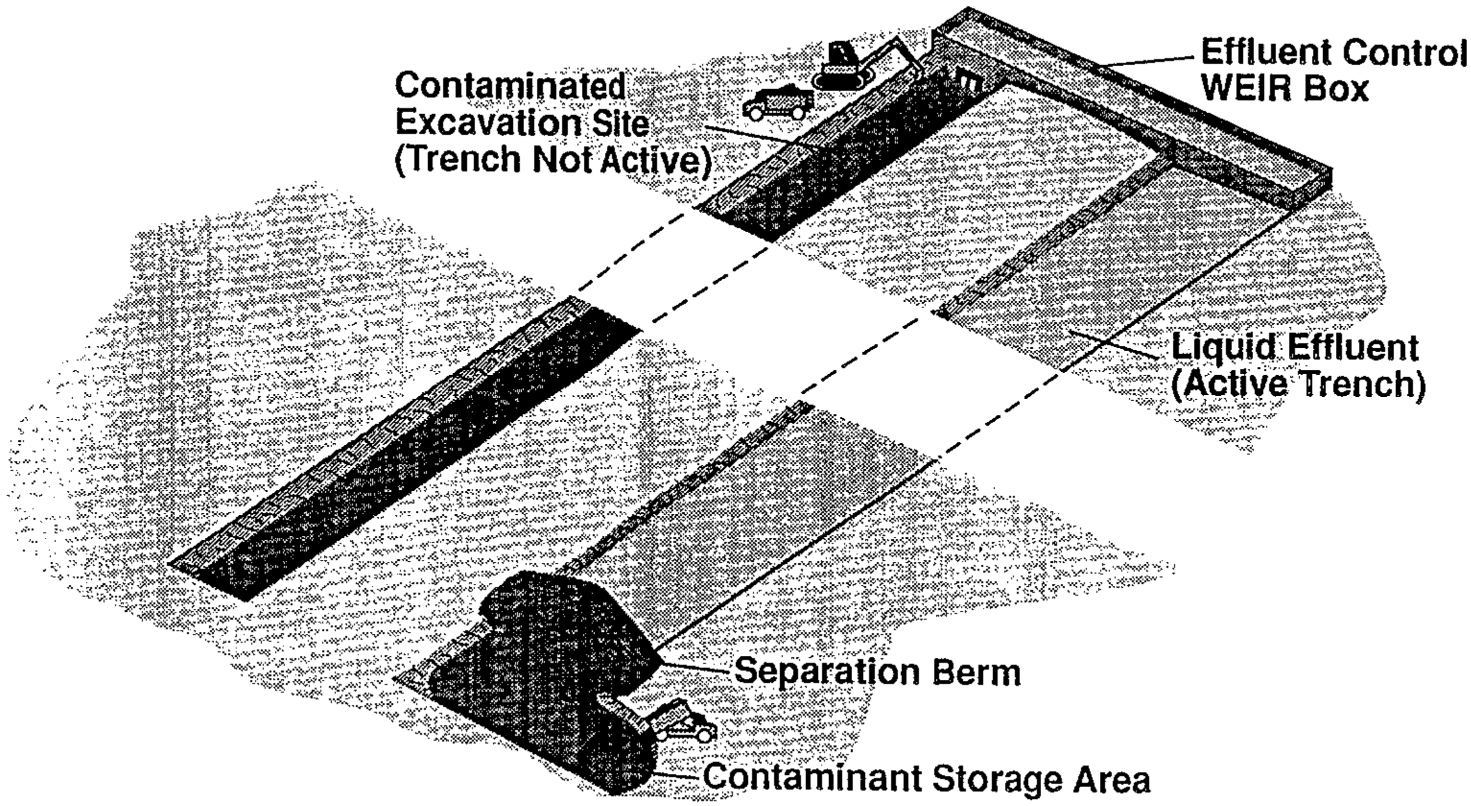
A summary of the evaluation of remedial alternatives for the EE/CA selection criteria is presented in Table 10. Based on the preliminary technology screening, screening factors, and selection criteria of the EE/CA, the preferred alternative for the 300 Area Process Trench ERA is to remove and interim stabilize the sediments within the fenced area of the process trenches. This alternative involves proven technologies that are applied easily at this mixed waste site. This alternative removes and isolates contaminated sediments from the active portion of the trenches allowing continued use of the trenches until an inspection and treatment facility is constructed. The alternative does not incorporate any materials or actions that preclude consideration of a technology for final remediation of the operable unit. The estimated initial and annual costs would enable this alternative to be implemented under the guidelines for an EPA-funded ERA ($2 million). Implementation of the alternative can be accomplished with trained personnel using familiar procedures to provide a safe operation that accomplishes the objective for removing a potential source of contamination, thereby reducing potential environmental threat to groundwater. Figure 5 is a conceptual representation of the preferred remedial alternative.

Table 10. Evaluation of Remedial Alternatives for Engineering Evaluation and Cost Analysis Selection Criteria.

Criteria	Process trench	Process pond	Central waste complex
	RELIABILITY/TECHNICAL FEASIBILITY		
Effectiveness	Environmental threat reduced through source reduction in active portion of trenches	Environmental threat reduced through source reduction in active portion of trenches	Environmental threat reduced through source reduction in active portion of trenches
Constructability	Requires excavation of contaminated sediments with transport to area for consolidation or disposal using standard equipment and procedures		
	Requires clean fill for cover and berm		Construction of storage building Transportation
Environmental Impacts	Short-term fugitive dust emission during excavation, transport, interim stabilization Application of herbicide or sterilant Long-term impact minimal; final remediation will address the sediments Removes radiological contaminated material used by swallows to build nests allowing for less dependency on screens for protection	Short-term fugitive dust emission during excavation, transport, interim stabilization Application of herbicide or sterilant Long-term impact minimal; final remediation will address the sediments Removes radiological contaminated material used by swallows to build nests allowing for less dependency on screens for protection	Short-term impacts include fugitive dust, noise, transportation, and waste disposal building. Removes radiological contaminated material used by swallows to build nests allowing for less dependency on screens for protection
Reliability	Proven technology	Proven technology	Proven technology
Useful Life	Several years with minimal maintenance	Several years with minimal maintenance	Several years to decades depending on drum integrity
	ADMINISTRATIVE/MANAGERIAL FEASIBILITY		
	Noise and fugitive dust pose minimal public nuisance during activities Requires health and safety protection for activities Uncontrolled use of earthmoving equipment after ERA uncertain DOE NEPA Categorical exclusion required Safety assessment for use of process effluent for dust control required		
	No variances or waiver from regulators required	Possible waiver required for consolidation in north pond Public acceptability questionable for placement of sediments closer to Columbia River	Interference with routine operation of trenches Eliminates use of equipment for other site activities for extended timeframe
COST	Capital cost $892,000 O&M costs $ 10,000 Under allocated funds	Capital cost $892,000 O&M costs $ 10,000 Under allocated funds	Capital cost $57 million O&M costs $0 Exceeds allocated funds

O&M = Operation and maintenance.

Sediment Removal and Consolidation



H9101006.1

Figure 5. Preferred Alternative.

Appendix E provides a copy of the project management plan that briefly describes the project and the various resource organizational roles in the ERA. A more detailed document will be developed as the work controlling document for removal, interim stabilization, and associated activities. The document will include the basic information required to perform the ERA activities (e.g., list of equipment, tools and supplies, procedures, industrial and radiological safety, quality assurance, sampling and analysis requirements).

7.0 REFERENCES

Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, Public Law 96-510, 94 Stat. 2767, (26 USC 1 et seq.)

DOE, 1985, *Closure/Post-Closure Plan 300 Area Process Trenches*, U.S. Department of Energy, Richland, Washington.

DOE, 1990, *Radiation Protection of the Public and the Environment*, DOE Order 5400.5, U.S. Department of Energy, Washington, D.C.

DOE-RL, 1990, *Remedial Investigation/Feasibility Study Work Plan for the 300-FF-1 Operable Unit Hanford Site, Richland, Washington*, DOE/RL 88-31 Draft D, U.S. Department of Energy-Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

EPA, 1983, *Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings*, Title 40, Code of Federal Regulations, Part 192, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1985, *National Oil and Hazardous Substances Pollution Contingency Plan*, Title 40, Code of Federal Regulations, Part 300, U.S. Environmental Protection Agency, Washington, D.C.

Hazardous Waste Cleanup--Model Toxics Control Act, 1989, Revised Code of Washington, Chapter 70.105D, Washington State Department of Ecology, Olympia, Washington.

National Environmental Policy Act of 1969, Public Law 91-190, 83 Stat. 852, 422 USC 4321 et seq.

OSHA, 1986, "Hazardous Waste Operations and Emergency Response Regulations," Title 29, Code of Federal Regulations, Part 1910, *Federal Register*, Vol. 51, No. 244, December 19, Occupational Safety and Health Administration, Washington, D.C.

Resource Conservation and Recovery Act of 1976, Public Law 94-580, 90 Stat. 2795, 42 USC 6901 et seq.

Schalla, R., R. W. Wallace, R. L. Aaberg, S. P. Airhard, D. J. Bates, J. V. M. Carlile, C. S. Cline, D. I. Dennison, M. D. Freshley, P. R. Heller, E. J. Jensen, K. B. Olsen, R. G. Parkhurst, J. T. Rieger, and E. J. Westergard, 1988, *Interim Characterization Report for the 300 Area Process Trenches*, PNL-6716, Pacific Northwest Laboratory, Richland, Washington.

WAC 173-303, *Dangerous Waste Regulations*, Washington State Department of Ecology, Olympia, Washington.

WAC 173-340, *Model Toxics Control Act-Cleanup*, Washington State Department of Ecology, Olympia, Washington.

WHC, 1988, *Environmental Compliance Manual*, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990a, *300 Area Process Wastewater Stream-Specific Report*, WHC-EP-0342, Addendum 1, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990b, *WIDS Database Field Descriptions and Data*, WHC-MR-0056 Revision 1, Westinghouse Hanford Company, Richland, Washington.

Zimmerman, M. G., and C. D. Kossick, 1987, *300 Area Process Trench Sediment Analysis Report*, WHC-SP-0193, Westinghouse Hanford Company, Richland, Washington.

8.0 BIBLIOGRAPHY

EPA, 1988, *Technological Approaches to the Cleanup of Radiologically Contaminated Superfund Sites*, EPA/540/2-88/002 1988, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1990, *Assessment of Technologies for the Remediation of Radiologically Contaminated Superfund Sites*, EPA/540/2-90/001 1990, U.S. Environmental Protection Agency, Washington, D.C.

Fitchko, J., 1989, *Criteria for Contaminated Soil/Sediment Cleanup*, Pudvan Publishing Company, Northbrook, Illinois.

APPENDIX A

JOINT LETTER FROM REGULATORS

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United States
Environmental Protection
Agency

Region 10
Hanford Project Office
712 Swift Boulevard, Suite 5
Richland WA 99352

DOE/RL-91-11
Draft A

EPA

December 20, 1990

Steven H. Wisness
Hanford Project Manager
U.S. Department of Energy
P.O. Box 550, A6-95
Richland, Washington 99352

Re: 300 Area Process Trenches Interim Response Action

Dear Mr. Wisness:

The U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) have reviewed the Interim Response Action (IRA) proposal for the 300 Process Trenches enclosed with your December 6, 1990 letter. Based upon that review, we believe that this project could provide positive environmental benefit by reducing the amount of uranium that is available for solubilizing out of the sediments and reaching the groundwater. We encourage you to proceed with detailed planning, including any non-intrusive field work necessary, to implement the project. For the purposes of this project, The EPA will be the lead regulatory agency and Ecology will be the support agency.

A final proposal will be required and must include sufficient detail for us to be able to prepare an Action Memorandum. The Action Memorandum will be the mechanism by which we approve start of field work.

The following items need to be addressed in the final proposal:

- The project should not include treatment by soil-washing. We suggest considering removing sediments from the southern portion of the trenches and moving the sediment to the northern portion. In addition, a reduction of flow to the trenches should be achieved as part of this action. The consolidated sediments would then be treated as part of the final remedial action selected for the 300-FF-1 Operable Unit, the RCRA closure plan. We encourage a later demonstration of the effectiveness of soil washing, but not as part of the IRA.

- Alternatively to the above, analysis of the feasibility of sediment removal to the North Pond should be investigated. As above, the consolidated sediments would be treated as part of the final remedial action and the RCRA closure plan.

- An Engineering Evaluation/Cost Assessment for this project is required. Of particular concern is the analysis of the two alternatives from an environmental and feasibility standpoint. The implementation of the IRA does not represent a final solution. The record of decision on this operable unit will reflect, in part, this action.

- The material excavated from the trenches must not be too wet. Earth moving equipment cannot handle material that is too wet and further, wet material would cause excess dragout to the road during transport if the North Pond option is utilized.

- The fixant or sealer used on the consolidated sediments must be selected so as to not preclude potential treatment techniques, e.g., soil-washing, or final remedial actions taken within the rest of the operable unit.

- ARARs must be identified, as removal actions must attain ARARs to the extent practicable.

- According to the October 18, 1990 Agreement in Principle, the funding for this project is in addition to that identified to meet previously identified activities required by the Tri-Party Agreement.

- It is important that we develop a meaningful public involvement process for this action that would begin in the near future. As part of this effort, we suggest that a fact sheet be prepared for this IRA to be used at the next Tri-Party quarterly meeting scheduled for mid-January. Additionally, we are requesting a project description to be submitted on this Interim Response Action no later than January 9, 1991.

If you have any questions on the above, please do not hesitate to contact either one of us. Additionally, we intend to maintain regular staff interaction, allowing for early identification of issues or concerns.

Sincerely,

Douglas R. Sherwood for
Paul T. Day
Hanford Project Manager
U.S. Environmental Protection Agency

L Goldstein for
Timothy L. Nord
Hanford Project Manager
Washington State Department of Ecology

cc: Willis Bixby, DOE
Roger Stanley, Ecology

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APPENDIX B

AGREEMENT IN PRINCIPLE

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DOE/RL-91-11
Draft A

AGREEMENT IN PRINCIPLE
Between the United States Department of Energy, the United States Environmental Protection Agency, and the State of Washington

THIS AGREEMENT is entered into between the United States Department of Energy (DOE), the United States Environmental Protection Agency (EPA), and the State of Washington.

WHEREAS, the parties to this AGREEMENT have previously entered into the Hanford Federal Facility Agreement and Consent Order on May 15, 1989, (Tri-Party Agreement) to provide for the coordinated efforts of all parties to assure compliance of DOE Hanford Site activities with requirements of the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), including corrective actions and remedial actions required by those Acts, and applicable state law; and

WHEREAS, the parties have pursuant to RCRA, CERCLA and the Tri-Party Agreement instituted the process of conducting CERCLA remedial investigations and feasibility studies (RI/FS) and RCRA facility assessments and corrective measures studies (RFI/CMS) of operable units on the Hanford Site; and

WHEREAS, the parties are desirous of taking immediate steps to accelerate the physical restoration of the Hanford Site prior to completion of RI/FS and RFI activities through performance of expedited response actions;

NOW, THEREFORE, DOE, EPA, and the State of Washington agree as follows:

1. That each party reaffirms its commitment to the Tri-Party Agreement.

2. That USDOE reaffirms its obligations and commitment to seek sufficient funding from Congress to meet all existing milestones in the Tri-Party Agreement and future new milestones or revised milestones established by agreement of the parties in accordance with Article XL of the Tri-Party Agreement.

3. DOE has identified a list of potential Hanford Site projects which may be considered for expedited response actions. Candidate projects under consideration for expedited response actions. include, but are not limited to:

   a. 618-9 Burial Ground Remediation
   b. 300 Area Process Trenches Sediment Removal
   c. 200 West Area Carbon Tetrachloride Treatment.

4. DOE will propose the selected projects to Ecology and EPA for their review of the technical basis, costs and feasibility for these projects. The three parties will jointly propose to the public those projects if they meet regulatory approval. The three parties will follow the public involvement procedures of the Tri-Party Agreement and the CERCLA National Contingency Plan.

5. Following regulatory and public review, DOE commits to implementing these three candidate projects, or other appropriate projects from the list, pursuant to a schedule agreed upon by the three parties. DOE commits to the implementation of these projects as additions to the Tri-Party Agreement and without an impact on the existing milestones of the Tri-Party Agreement.

6. In order to understand the total activities under consideration and to establish a baseline for the activity which can be used as a basis for decisions and against which progress can be measured, the initial step for each of the potential projects is the development of a detailed cost estimate based upon that plan.

7. These activities will be conducted in a manner consistent with prudent management and will serve as a model for future activities in the Environmental Restoration and Waste Management Program.

8. The parties will use their best efforts to complete the steps identified in the foregoing paragraphs as soon as practical.

NOW, THEREFORE, the parties hereto have signed this AGREEMENT in recognition of their pledge of mutual best efforts to achieve through cooperation and negotiation, in good faith, the understandings as set forth above on this 18th day of October, 1990.

James D. Watkins
Secretary of Energy

William Reilly, Administrator
U. S. Environmental Protection Agency

Honorable Booth Gardner, Governor
State of Washington

APPENDIX C

WASTE INFORMATION DATA SYSTEM REPORT FOR THE 316-5 PROCESS TRENCHES

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Waste Information Data System
General Summary Report
February 12, 1991

SITE NAME: 316-5
ALIASES: 3904 Process Waste Trenches; 300 Area Process Trenches

SITE TYPE: Trench
WASTE CATEGORY: Mixed Waste
WASTE TYPE: Liquid

STATUS: Active
START DATE: May 1975

OPERABLE UNIT: 300-FF-1
TSD NUMBER: D-3-1
REG. AUTHORITY: TSD
DOE/RL PROGRAM: Site Management Division

This site is included in the Tri-Party Agreement Action Plan

The following have been submitted for this site: Part A Permit
Interim Closure Plan

DESIGNATED AREA: 300 Area
COORDINATES: S21691 E13623, S21965 E13293, S23226 E13641, S23230 E13311
LOCATION: North of 300 Area

GROUND ELEVATION: 371.00 feet above MSL
WATER TABLE DEPTH: 21.00 feet below grade

SITE DESCRIPTION:
Two trenches running north-south [329], 60 ft apart (between centerlines). Each trench is 1,535 ft long, 10 ft wide and 12 ft deep, with a side slope of 1:1.5. Separating the trenches is an earth dike, 50 ft wide at the bottom (top width varies) and 12 ft high [NR].

ASSOCIATED STRUCTURES:
A 24-in. V.C. inlet line (only 1 ft is within the excavation);
An outlet structure: one 70-ft-long by 10-ft-high section with two 16-ft-long by 10-ft-wide by 10-ft-high sections placed perpendicularly to it (one on each end);
The outlet structure contains gratings, oil baffles, gates, and concrete aprons [NR].

SITE NAME: 316-5	Page 2

WASTE TYPES AND AMOUNTS:

The site receives process wastewater from 300 Area facilities (flow estimated at 2M to 3M gal/d) [NR]. The unit receives nonregulated process and cooling water from operations in the 300 Area. The unit also historically received dangerous waste from several research and development laboratories and from the fuels fabrication process. These wastes were discharged to the unit and allowed to percolate into the soil column underlying the site. The annual waste quantity is one billion pounds per year and reflects the total flow to the unit, not a volume of dangerous waste discharged to the unit. No dangerous wastes have been discharged to the unit since November 1985.

KNOWN RELEASES:

UPR-300-8, UPR-300-9, UPR-300-15, UPR-300-19, UPR-300-20, UPR-300-21, UPR-300-22, UPR-300-23, UPR-300-24, UPR-300-25, UPR-300-36, UPR-300-27, UPR-300-28, UPR-300-29, UPR-300-30, UPR-300-32, UPR-300-33.

APPENDIX D

SOIL SAMPLE DATA SUMMARY

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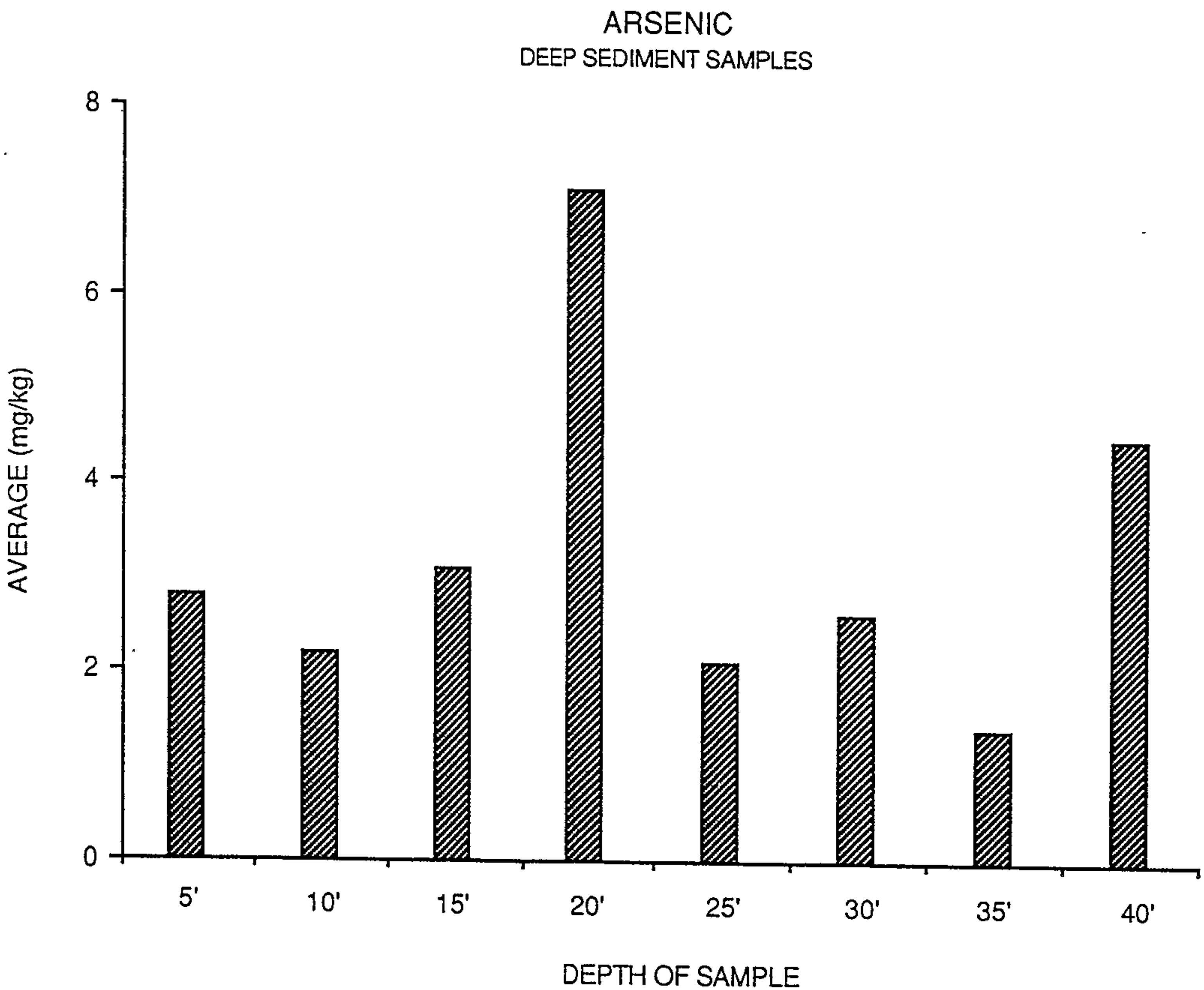
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DEEP SEDIMENT SAMPLES
AVERAGE (mg/kg)
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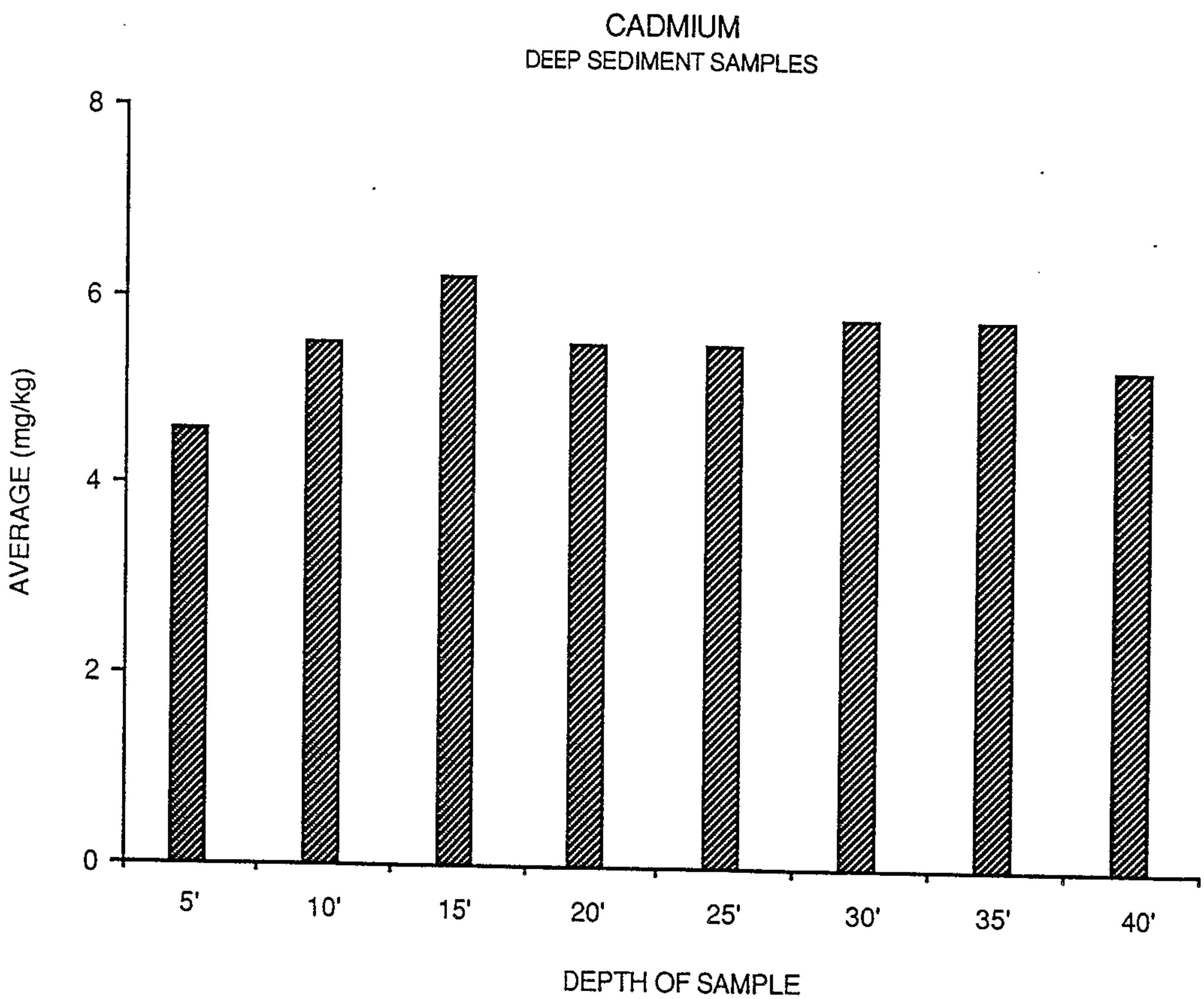
30'
35'
40'
DEPTH OF SAMPLE


CADMIUM
DEEP SEDIMENT SAMPLES
AVERAGE (mg/kg)
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6
4
2
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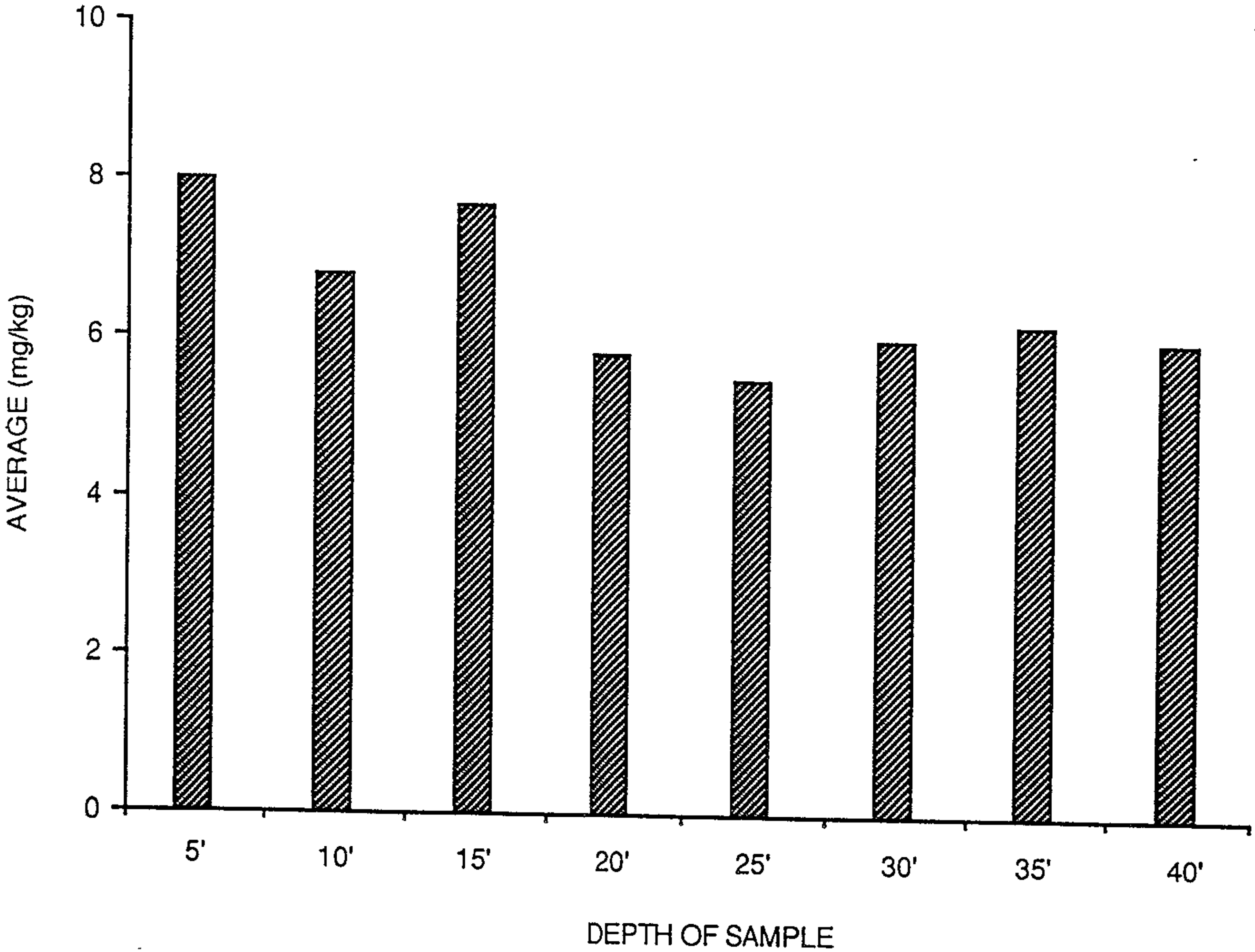
10'
15'
20'
25'
30'
35'
40'
DEPTH OF SAMPLE

CHROMIUM
DEEP SEDIMENT SAMPLES



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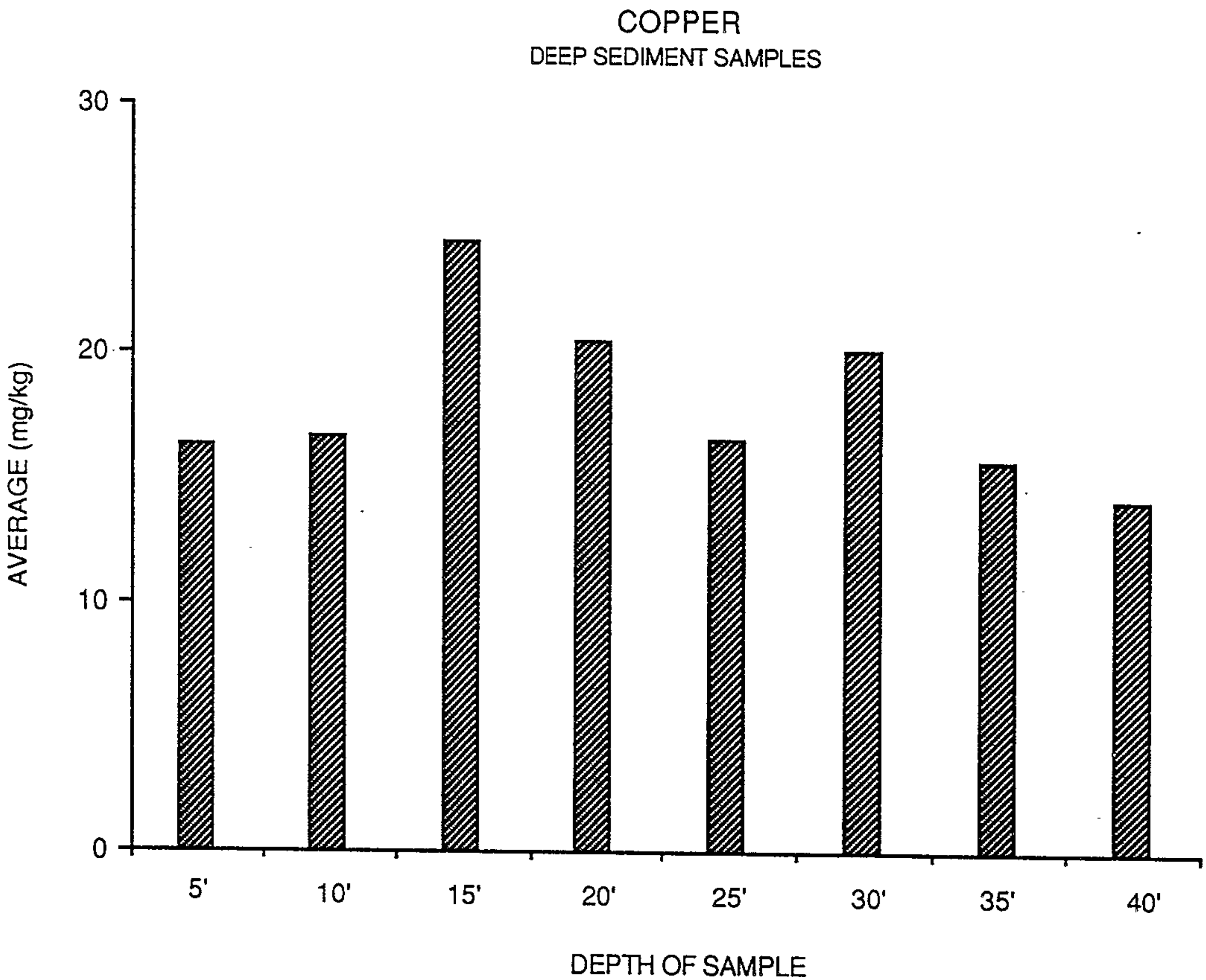

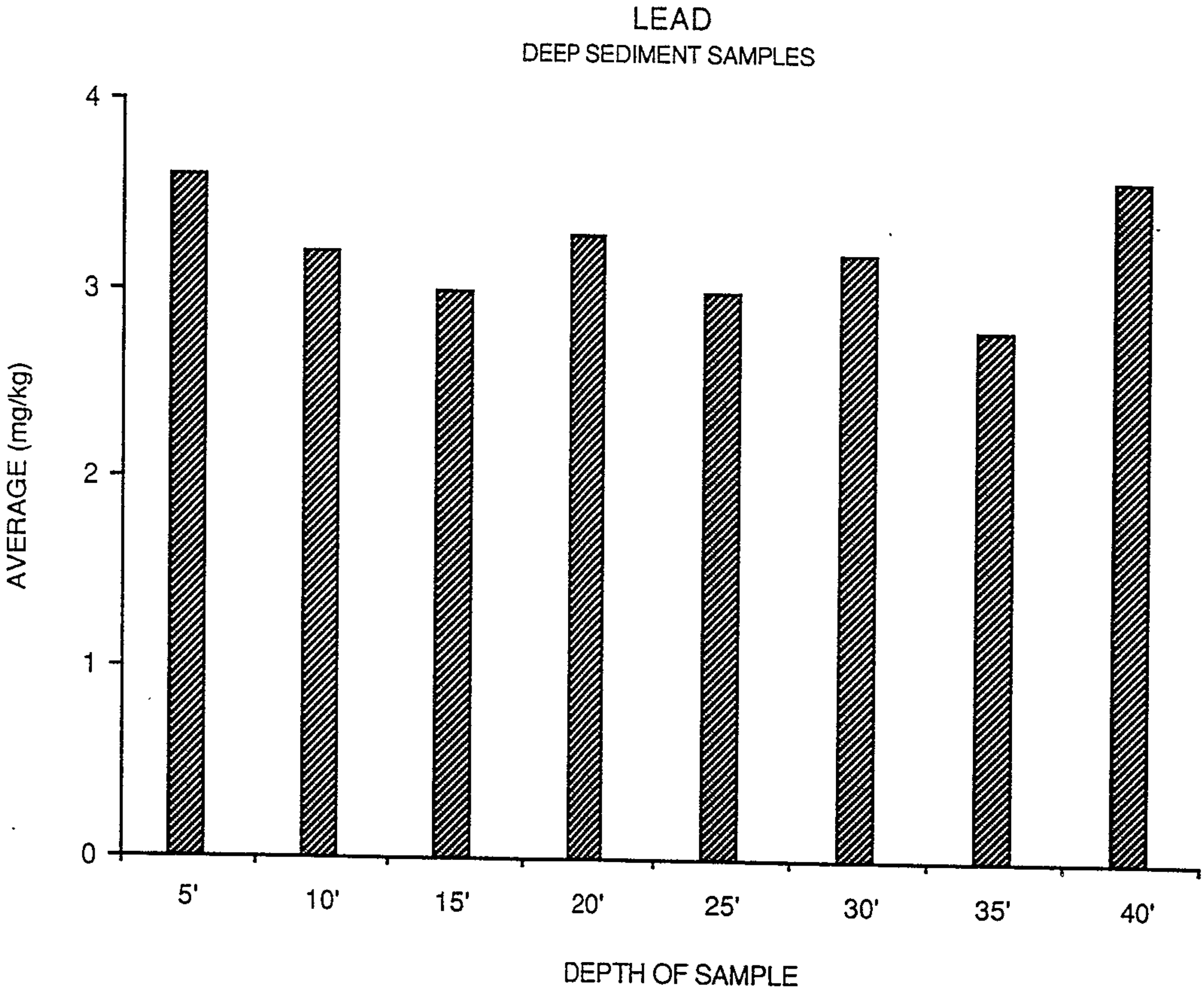
LEAD
DEEP SEDIMENT SAMPLES
AVERAGE (mg/kg)
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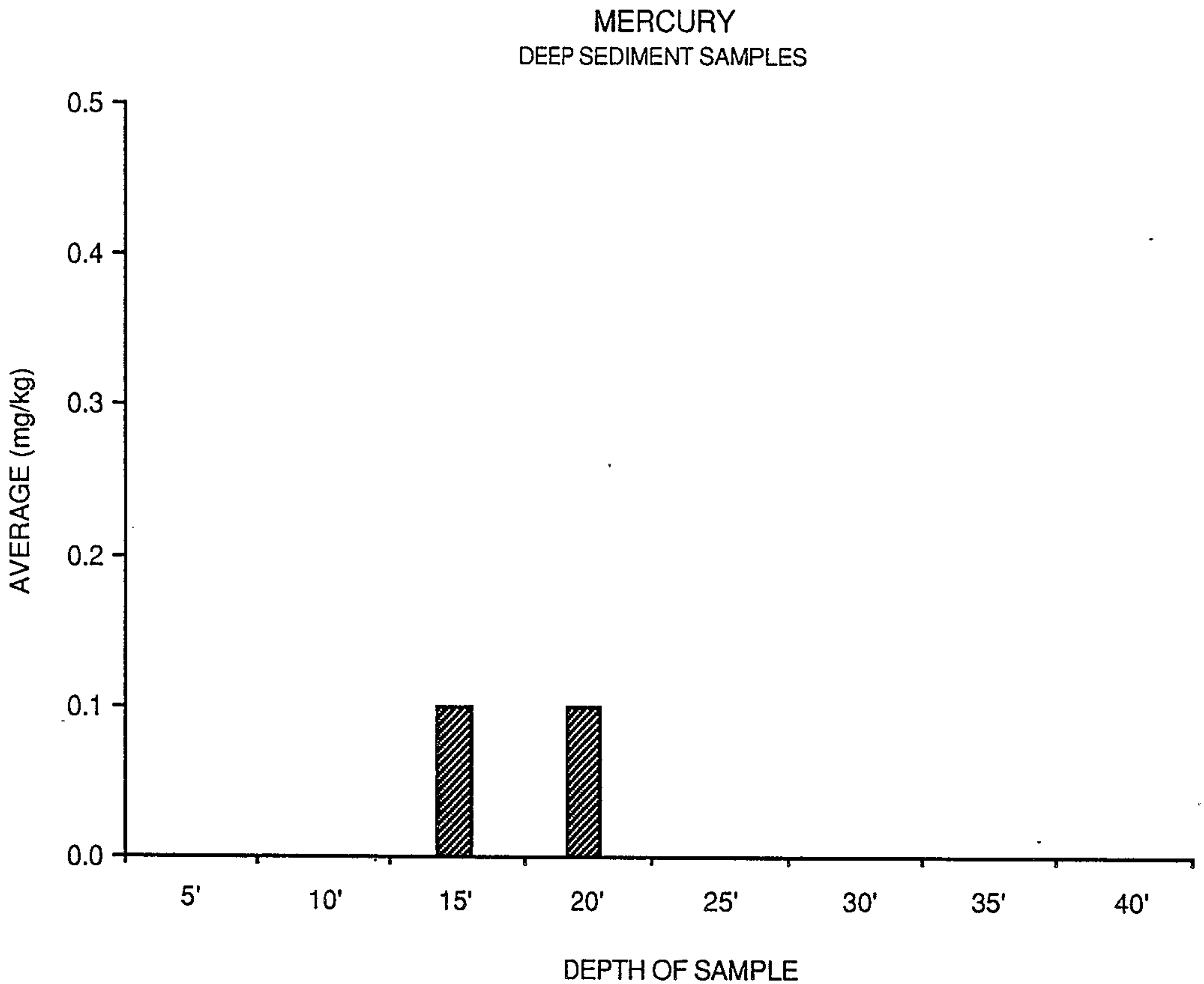
2
3
4
5'
10'
15'
20'
25'
30'
35'
40'
DEPTH OF SAMPLE


MERCURY
DEEP SEDIMENT SAMPLES
AVERAGE (mg/kg)
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0.4
0.3
0.2
0.1
0.0
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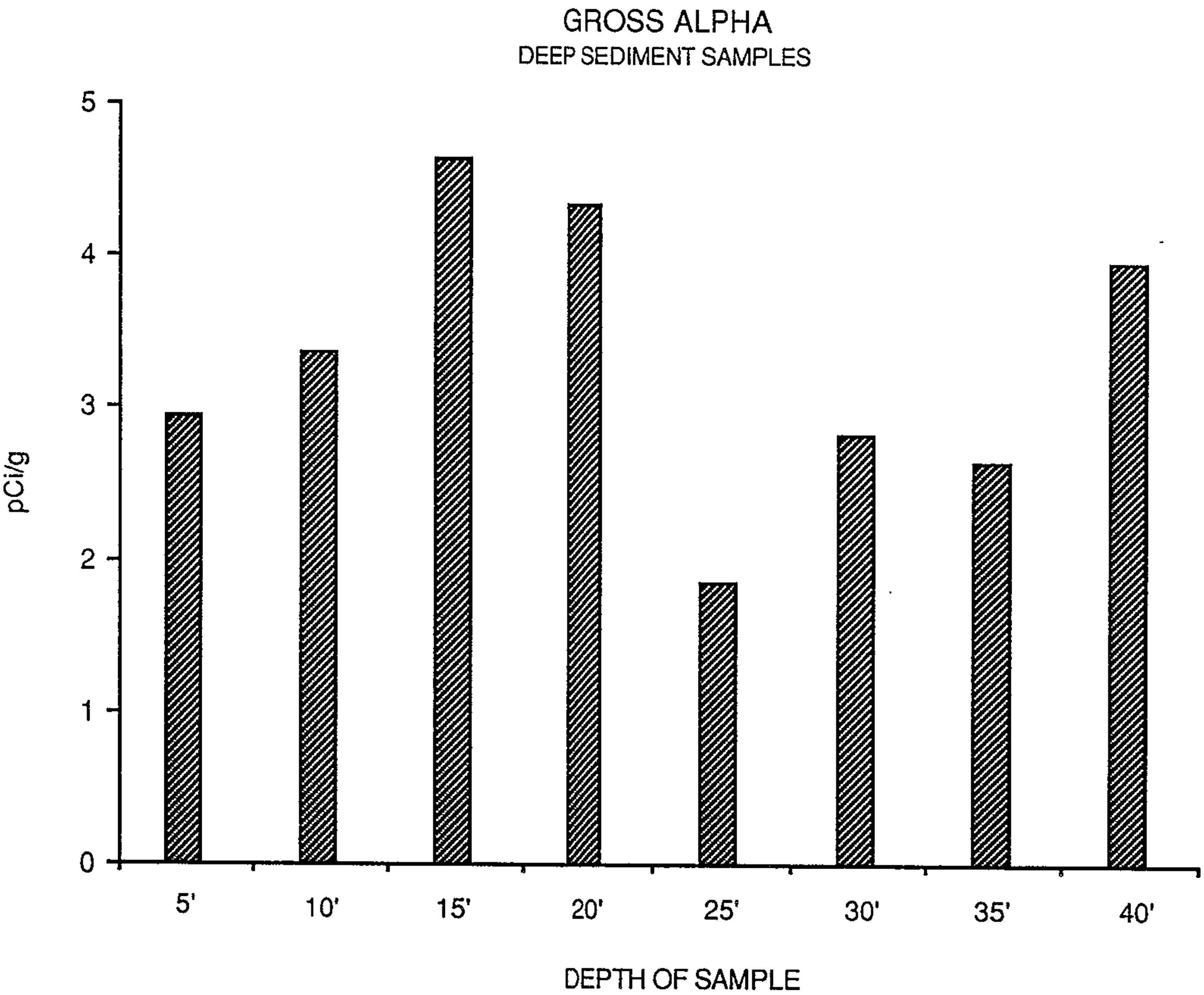
10'
15'
20'
25'
30'
35'
40'
DEPTH OF SAMPLE


GROSS ALPHA
DEEP SEDIMENT SAMPLES
pCi/g
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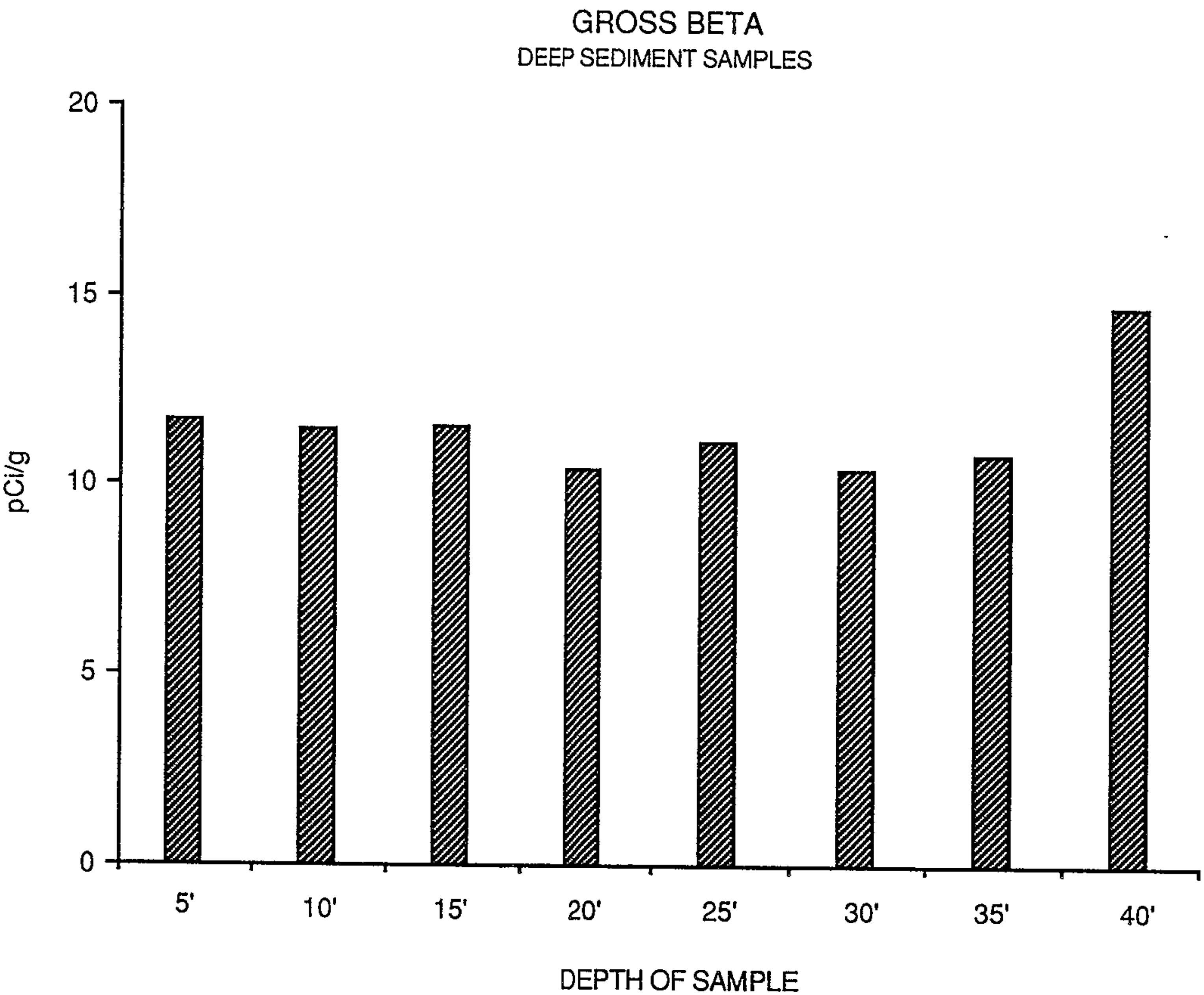
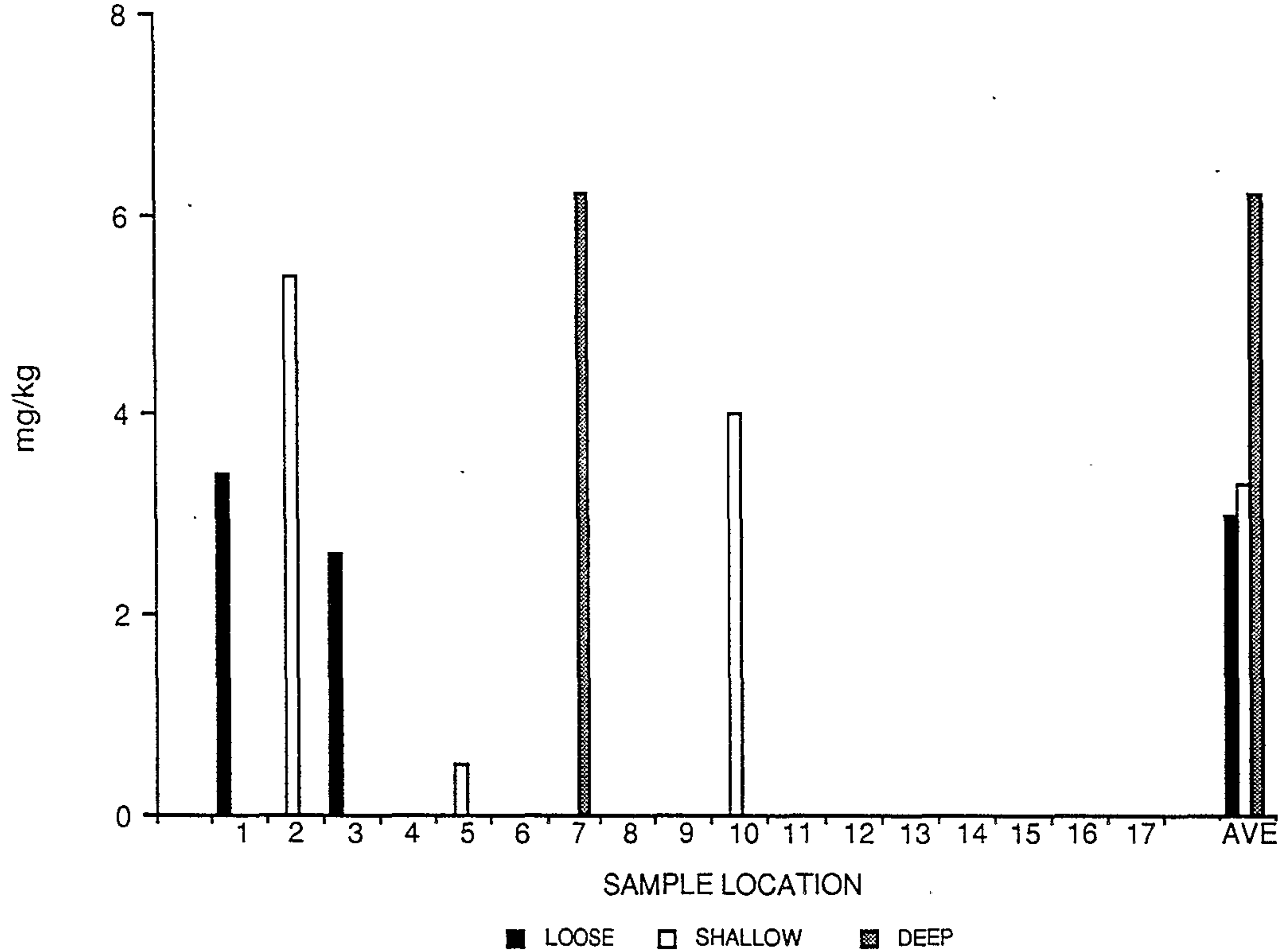
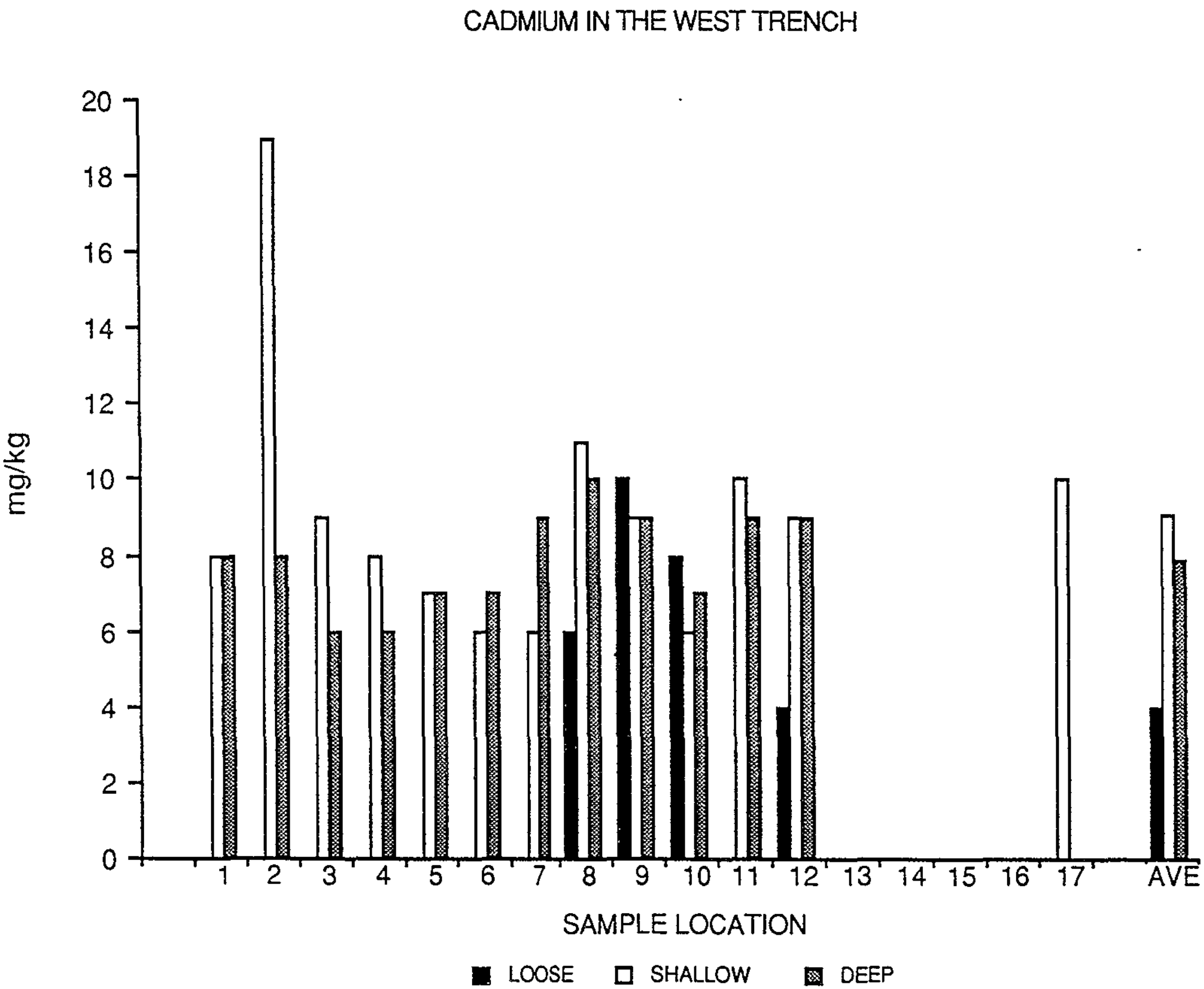
35'
40'
DEPTH OF SAMPLE

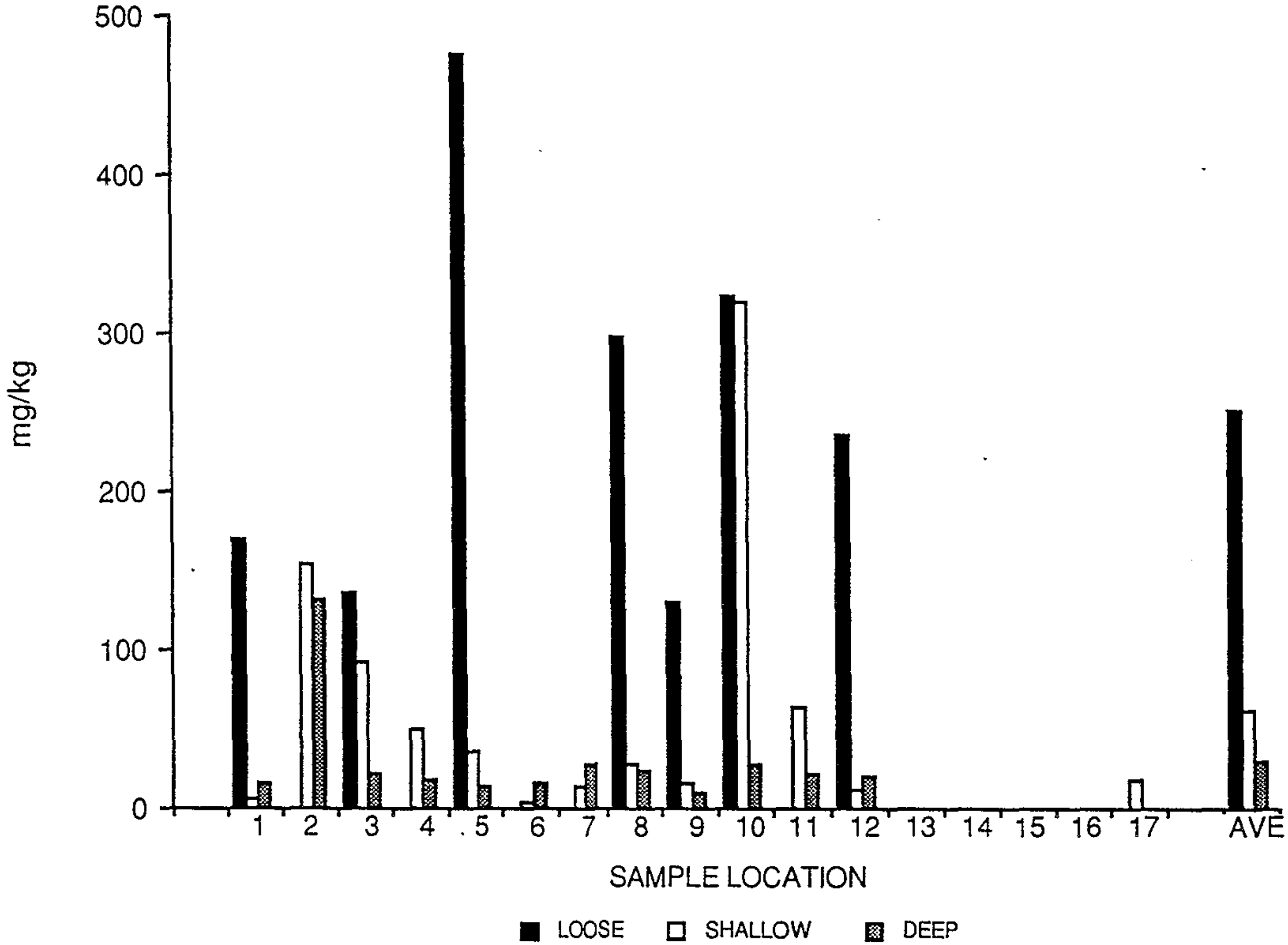

GROSS BETA
DEEP SEDIMENT SAMPLES
pCi/g
20
15
10
5
0
5'
10'
15'
20'
25'
30'
35'
40'
DEPTH OF SAMPLE

ARSENIC IN THE WEST TRENCH

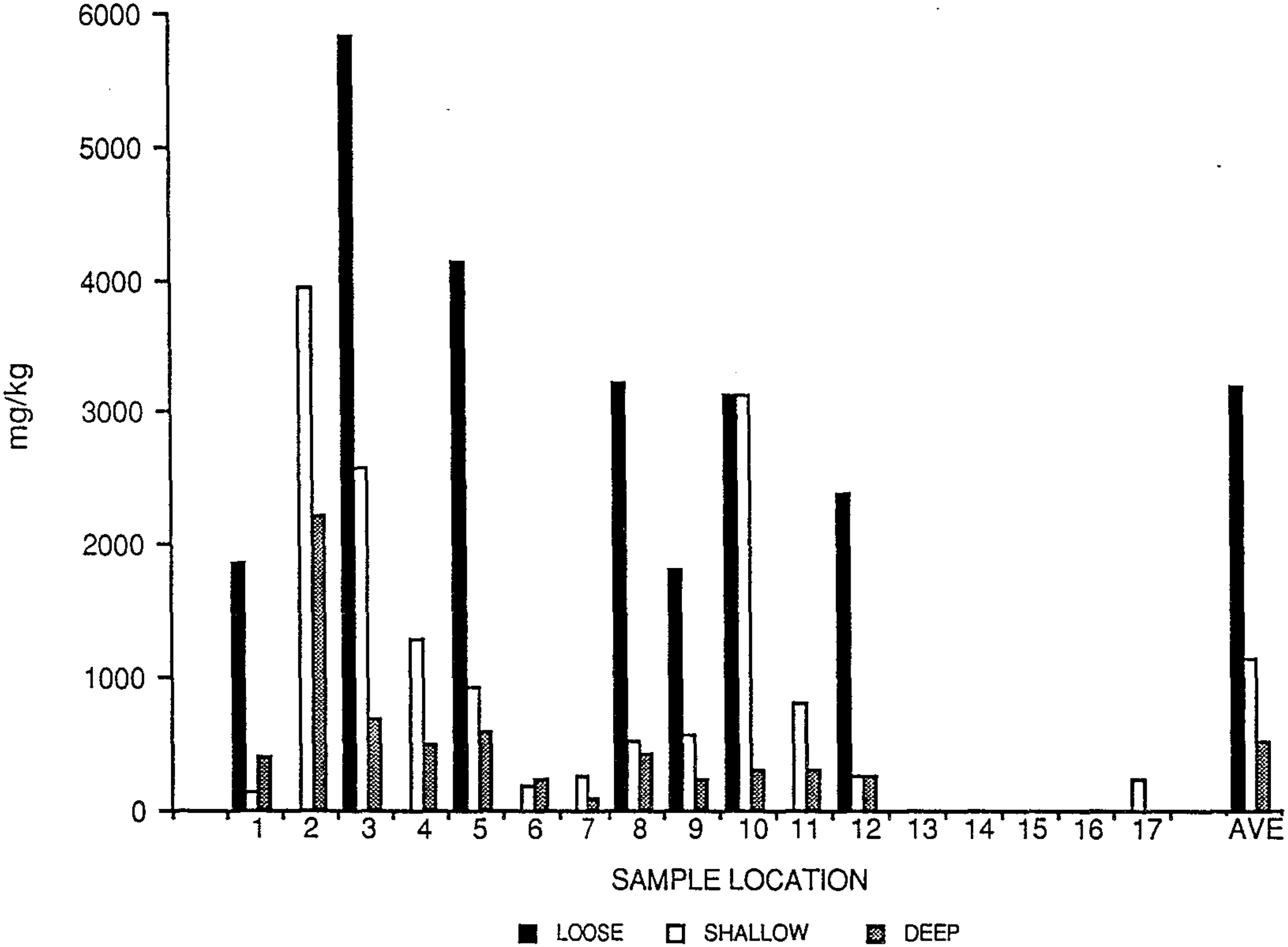


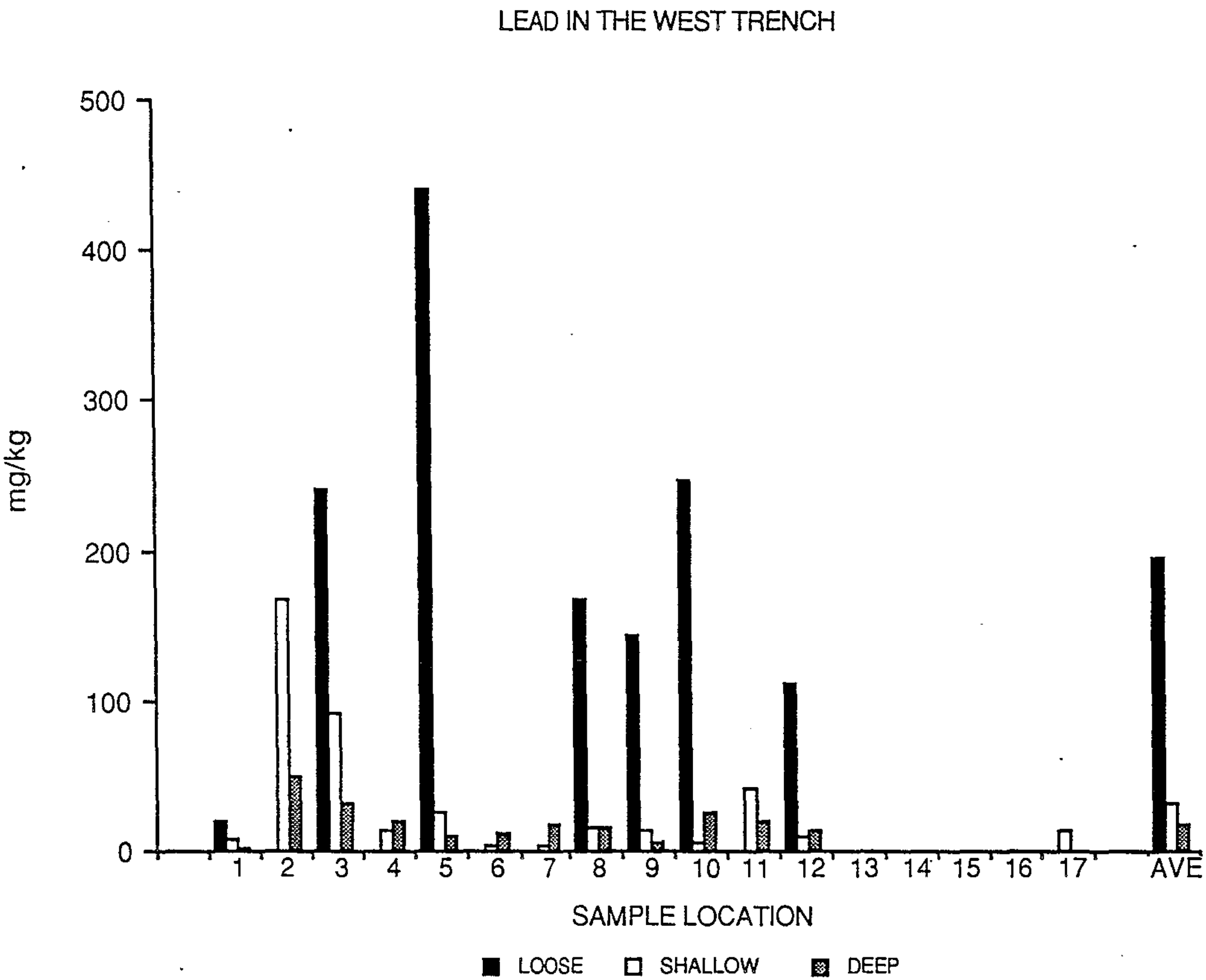

CADMIUM IN THE WEST TRENCH
20
18
16
14
12
10
8
6
4
2
0
mg/kg
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
AVE
SAMPLE LOCATION
LOOSE
SHALLOW
DEEP

CHROMIUM IN THE WEST TRENCH

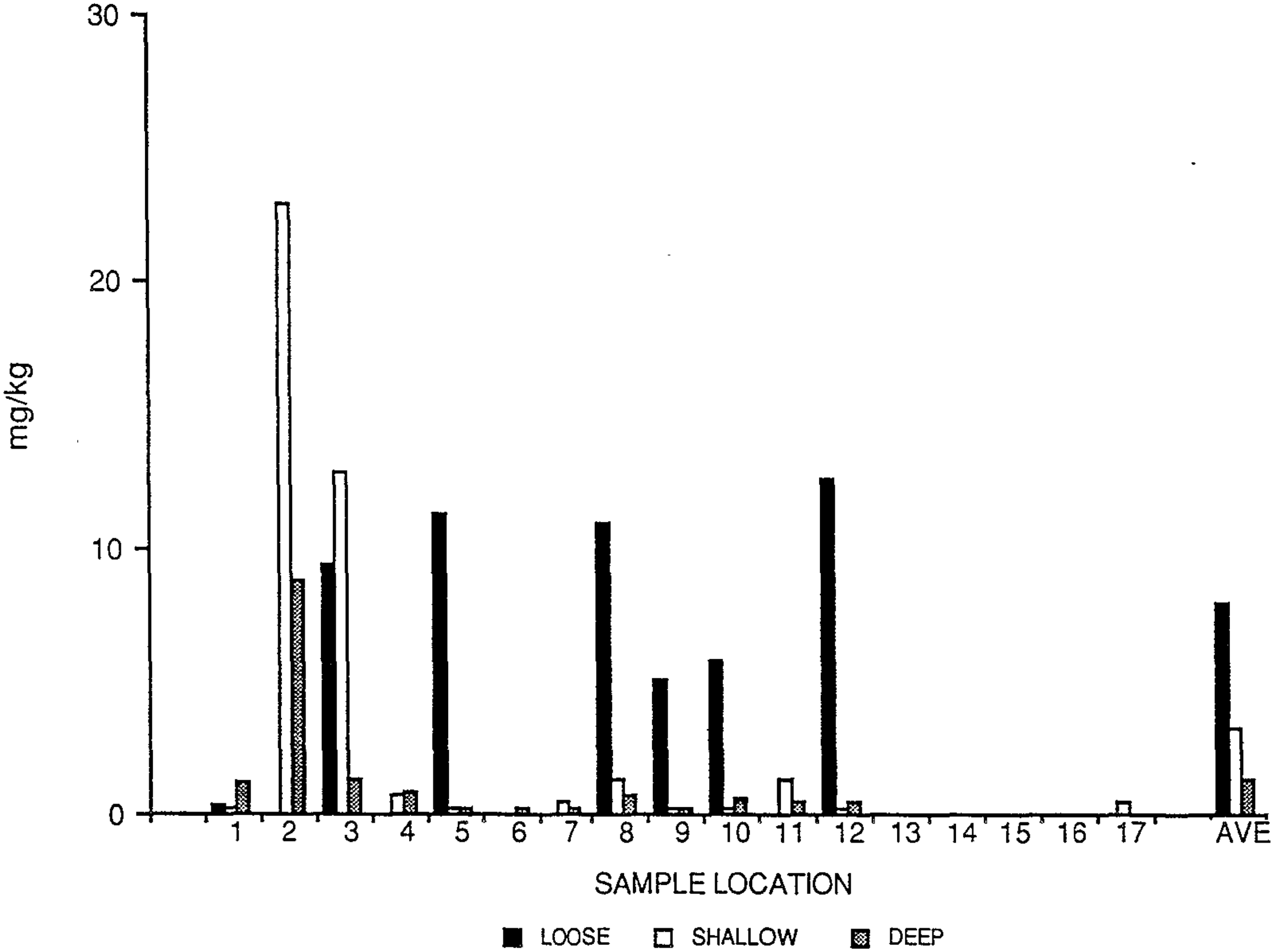


COPPER IN THE WEST TRENCH

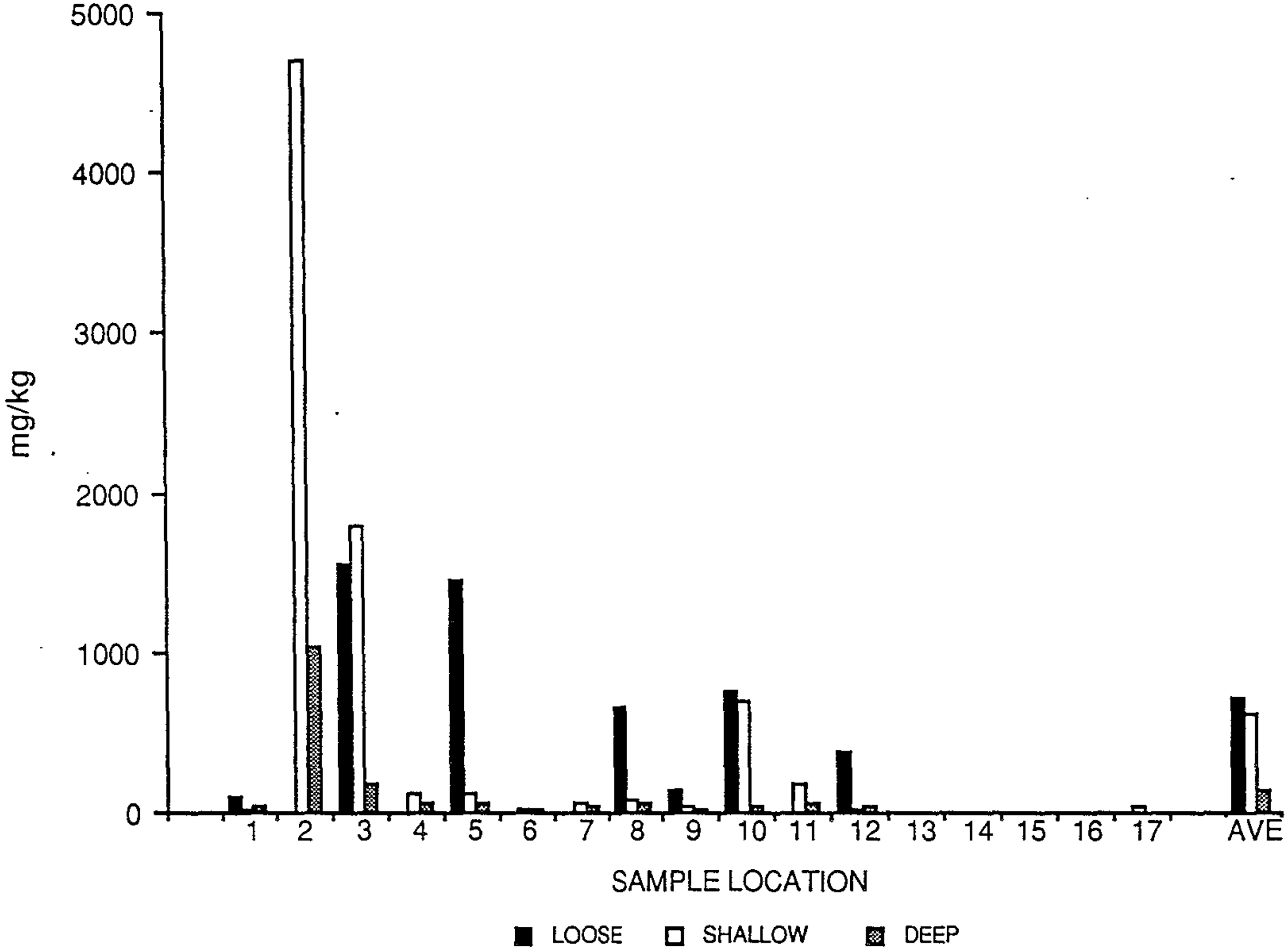



LEAD IN THE WEST TRENCH
500
400
300
200
100
0
mg/kg
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
AVE
SAMPLE LOCATION
LOOSE
SHALLOW
DEEP

MERCURY IN THE WEST TRENCH



NICKEL IN THE WEST TRENCH



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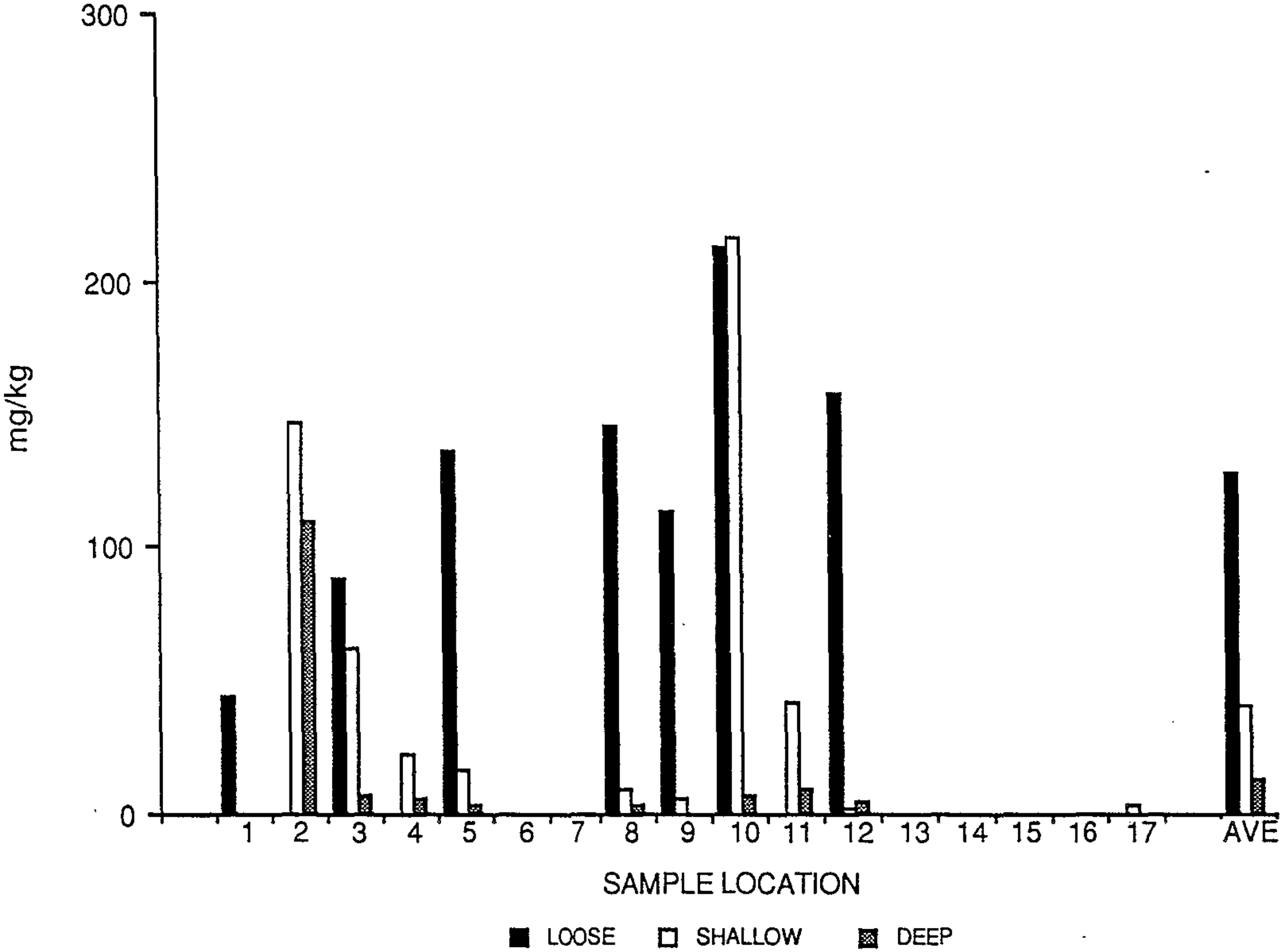
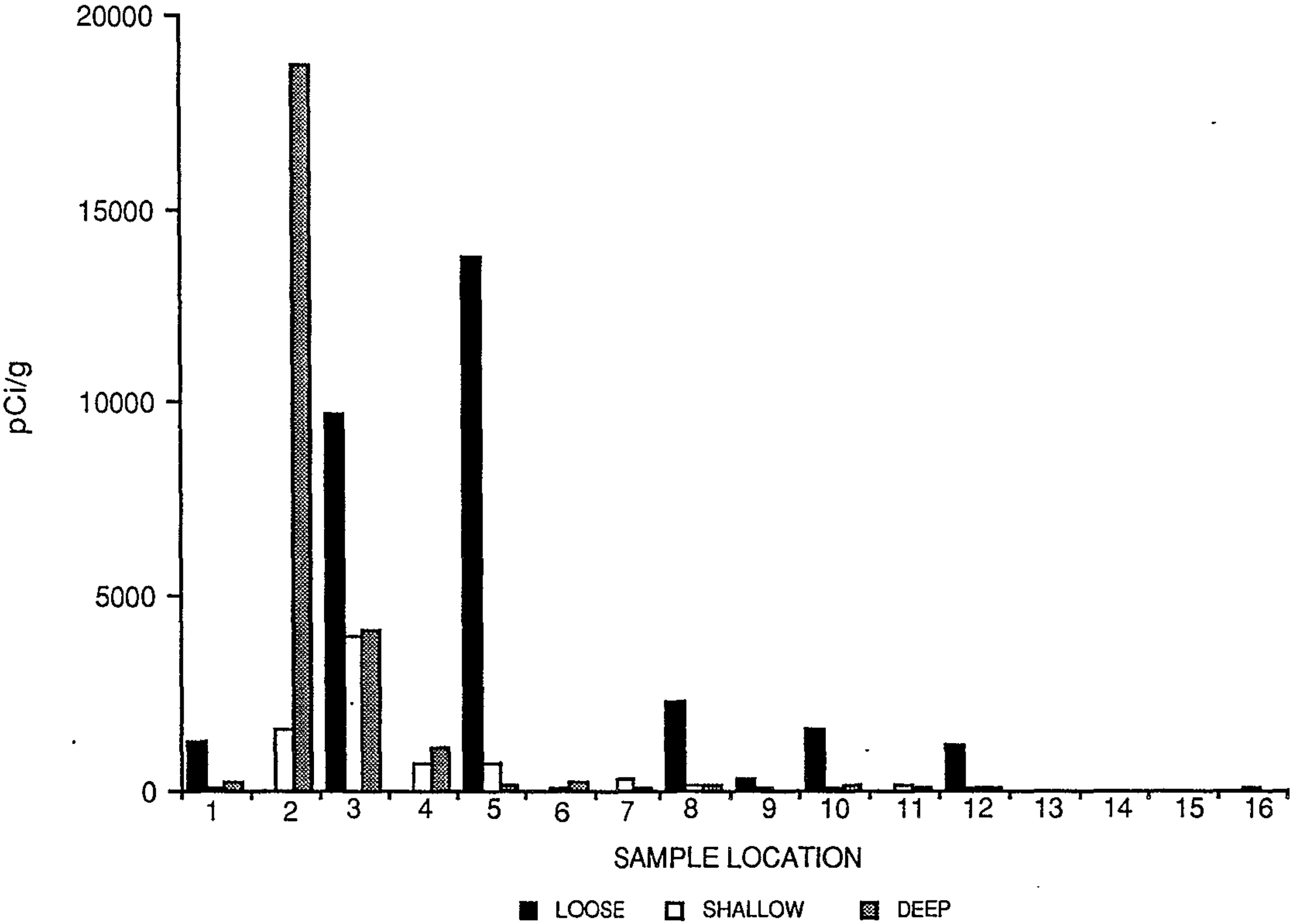


GROSS ALPHA IN THE WEST TRENCH



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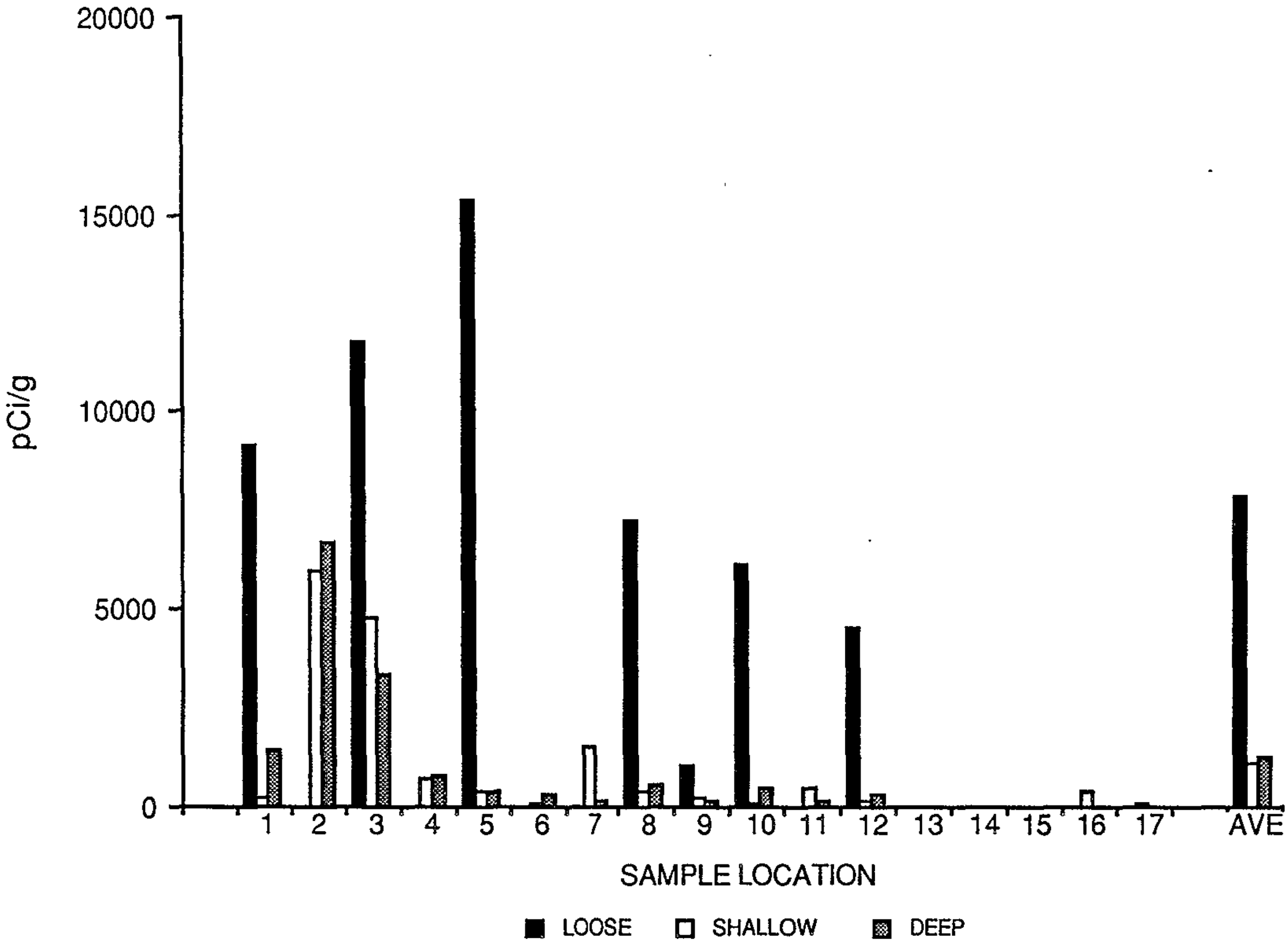
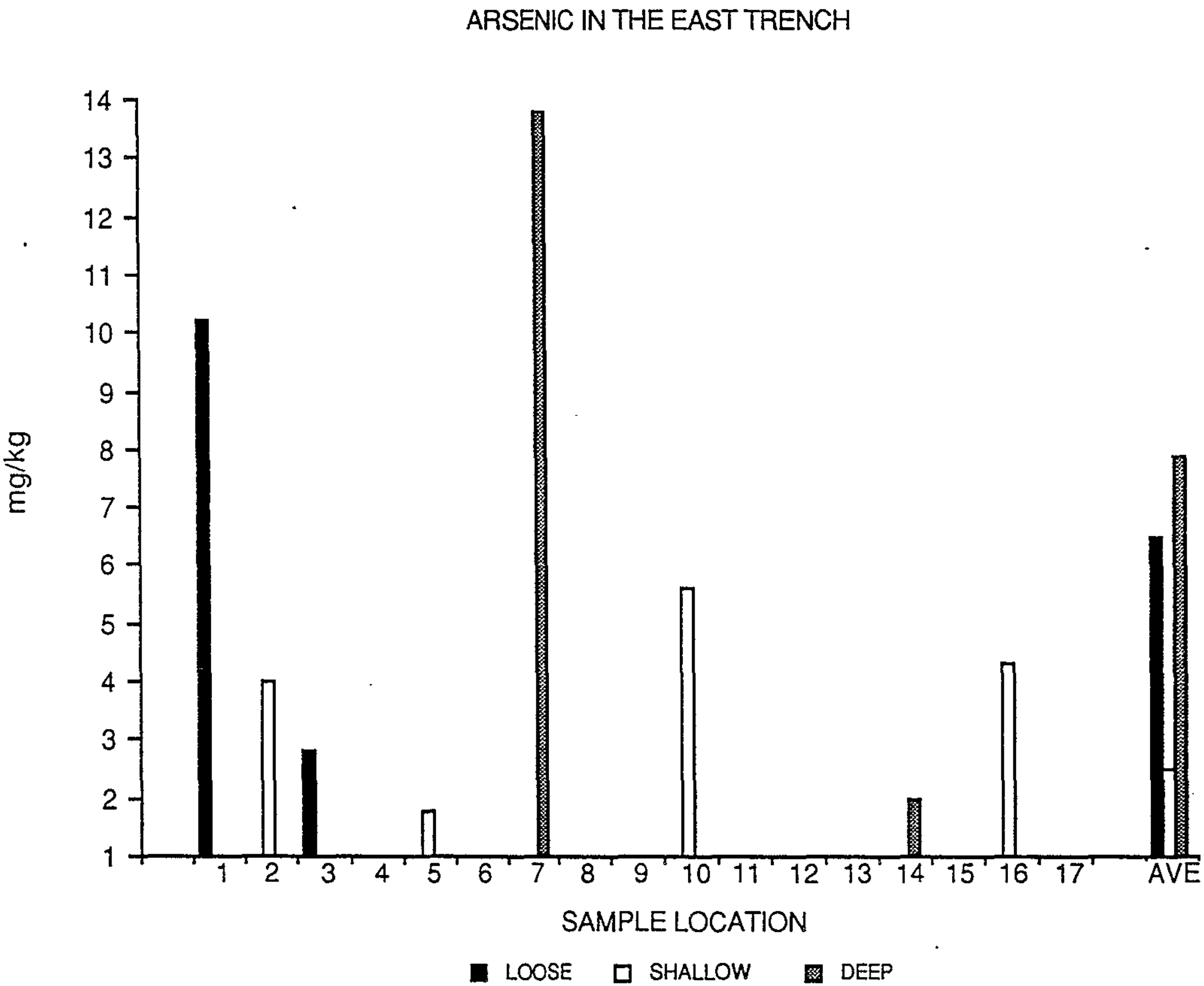
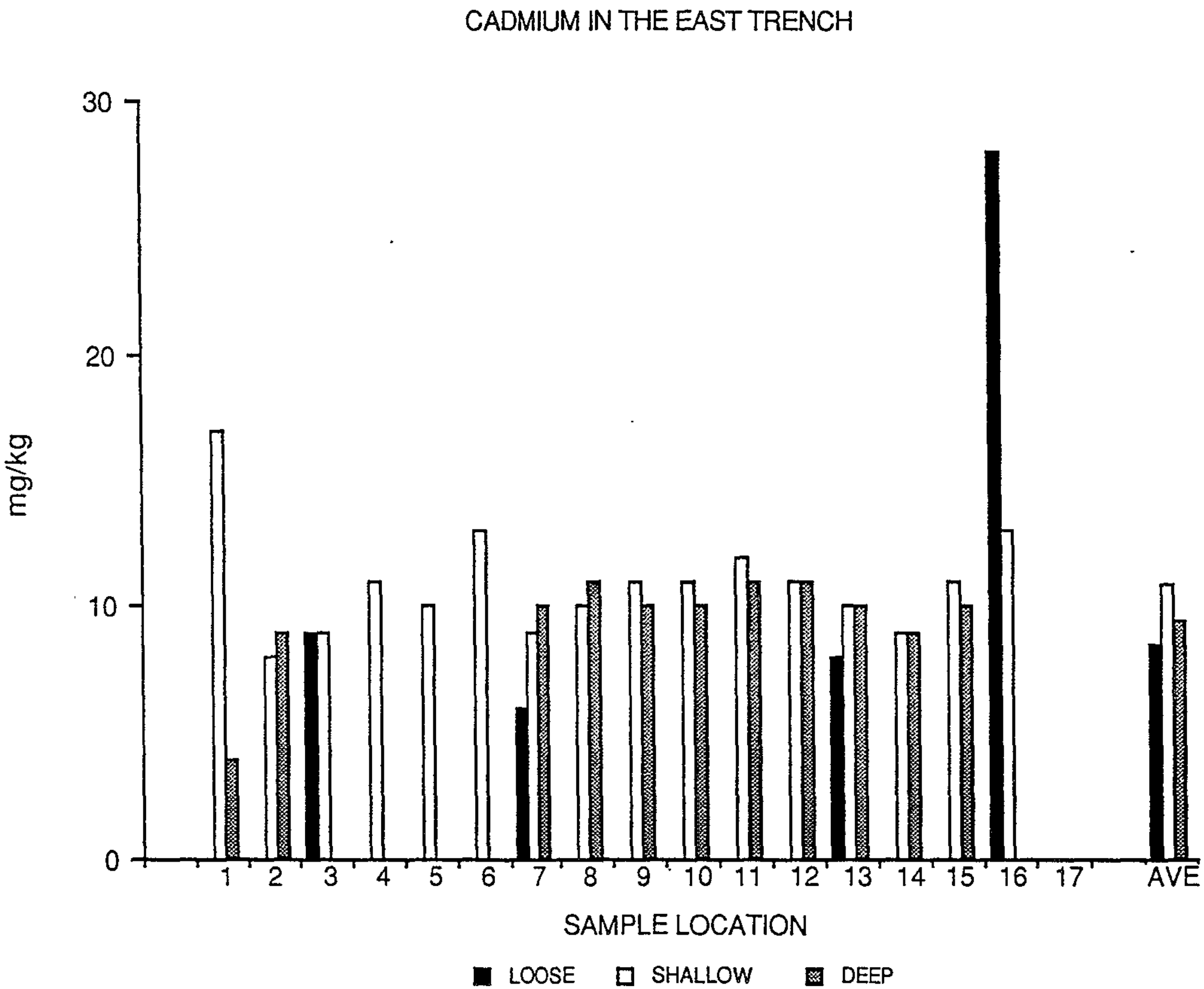
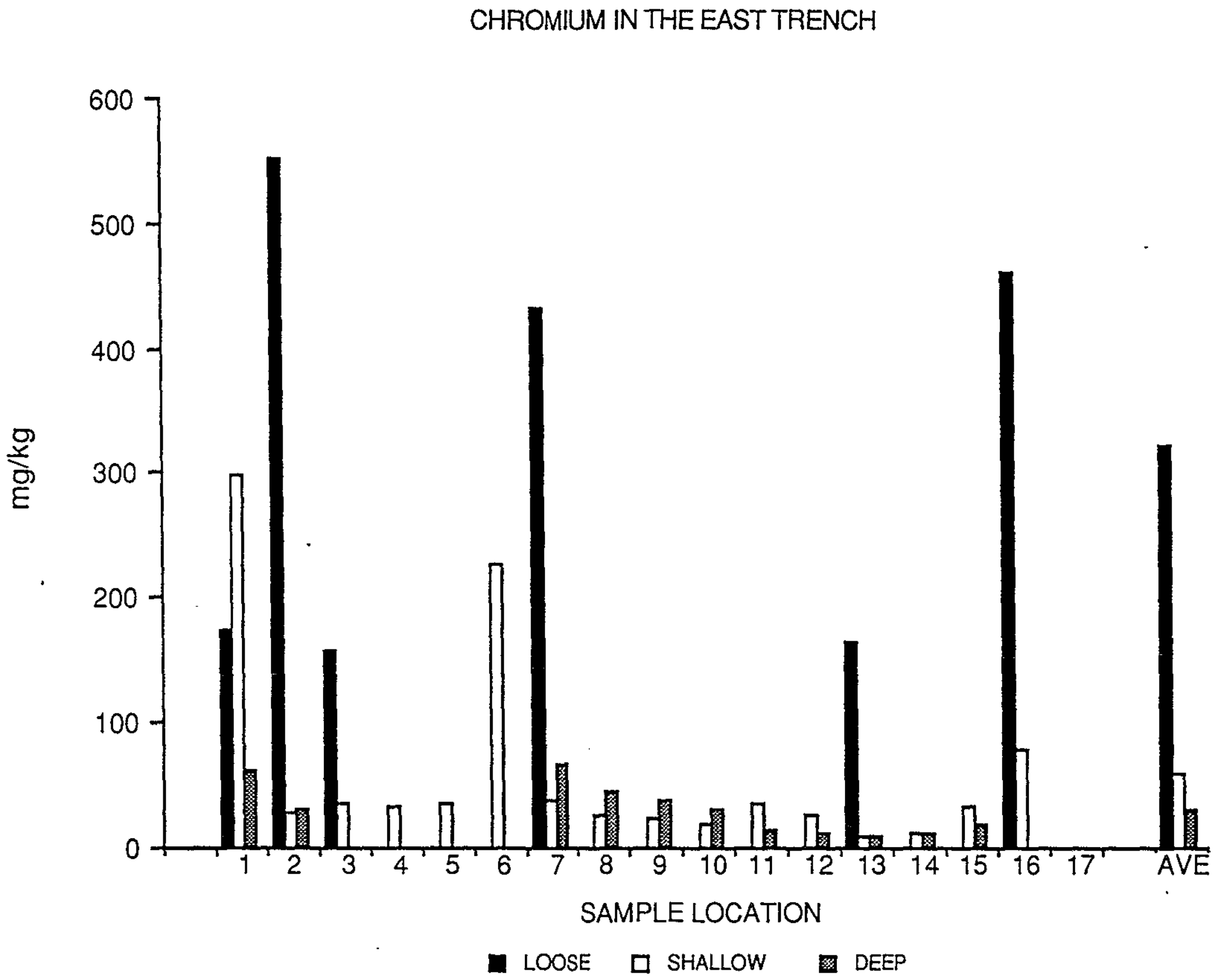
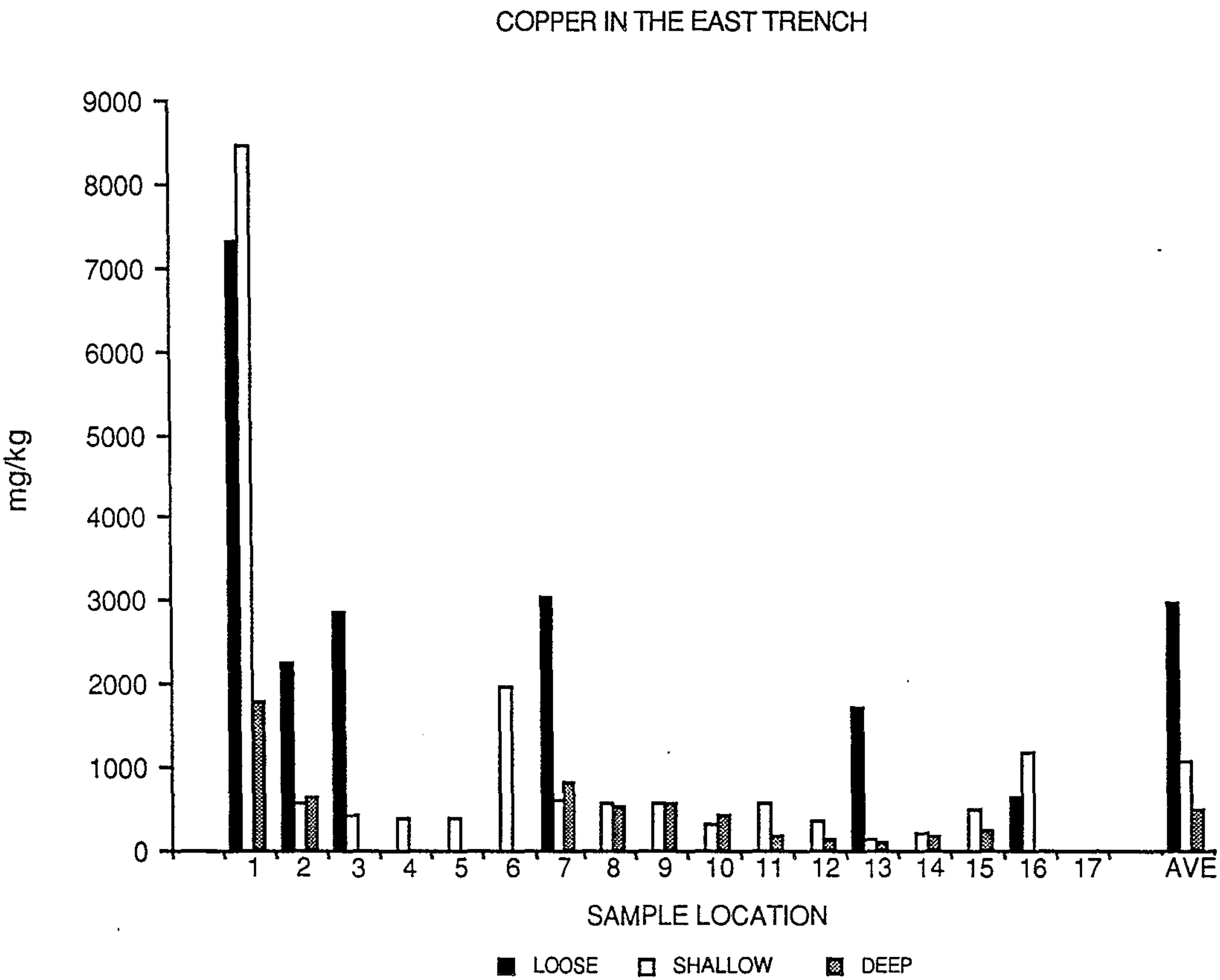


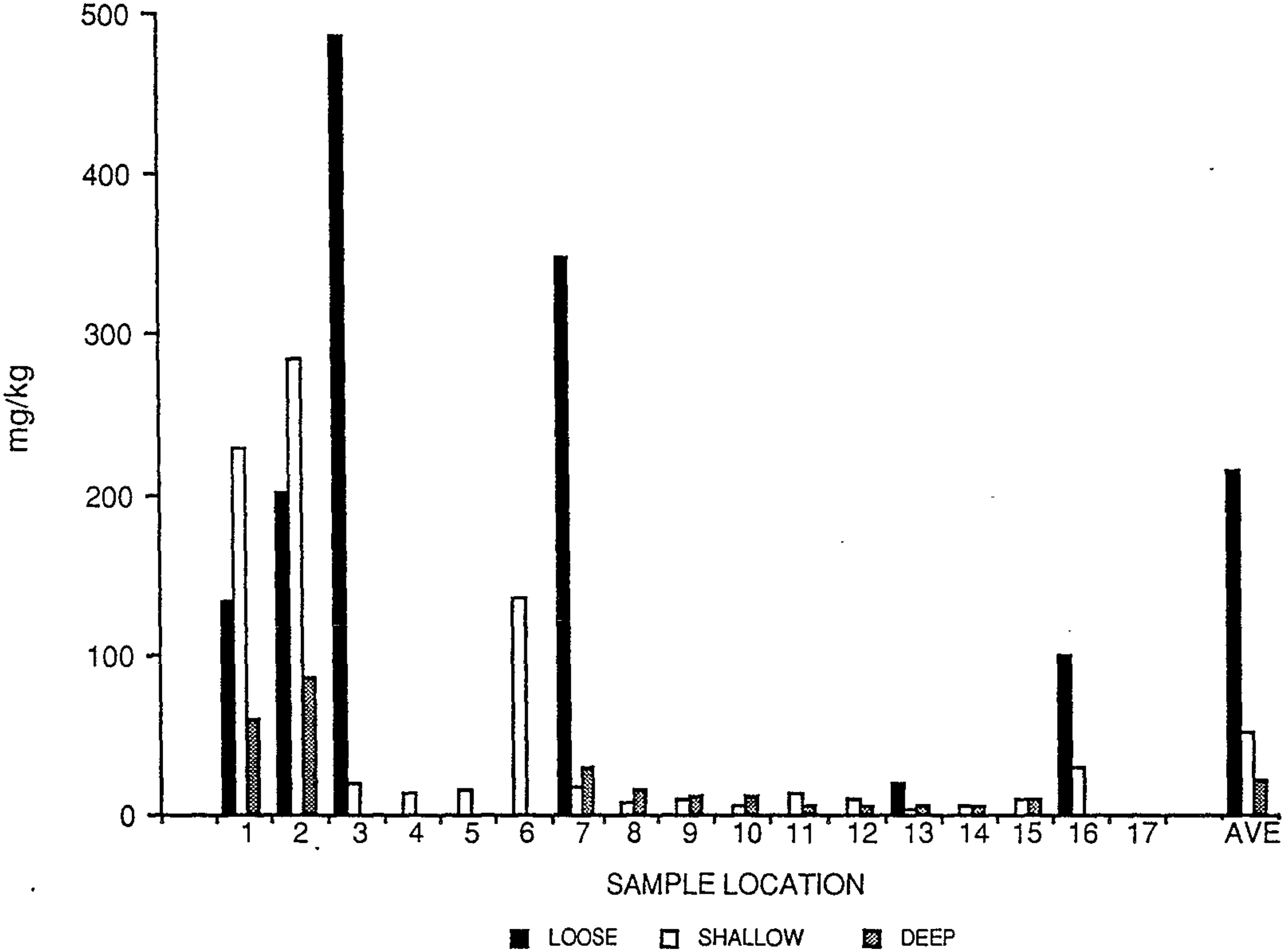

ARSENIC IN THE EAST TRENCH
mg/kg
14
13
12
11
10
9
8
7
6
5
4
3
2
1
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
AVE
SAMPLE LOCATION
LOOSE
SHALLOW
DEEP


CADMIUM IN THE EAST TRENCH
30
20
10
0
mg/kg
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
AVE
SAMPLE LOCATION
LOOSE
SHALLOW
DEEP

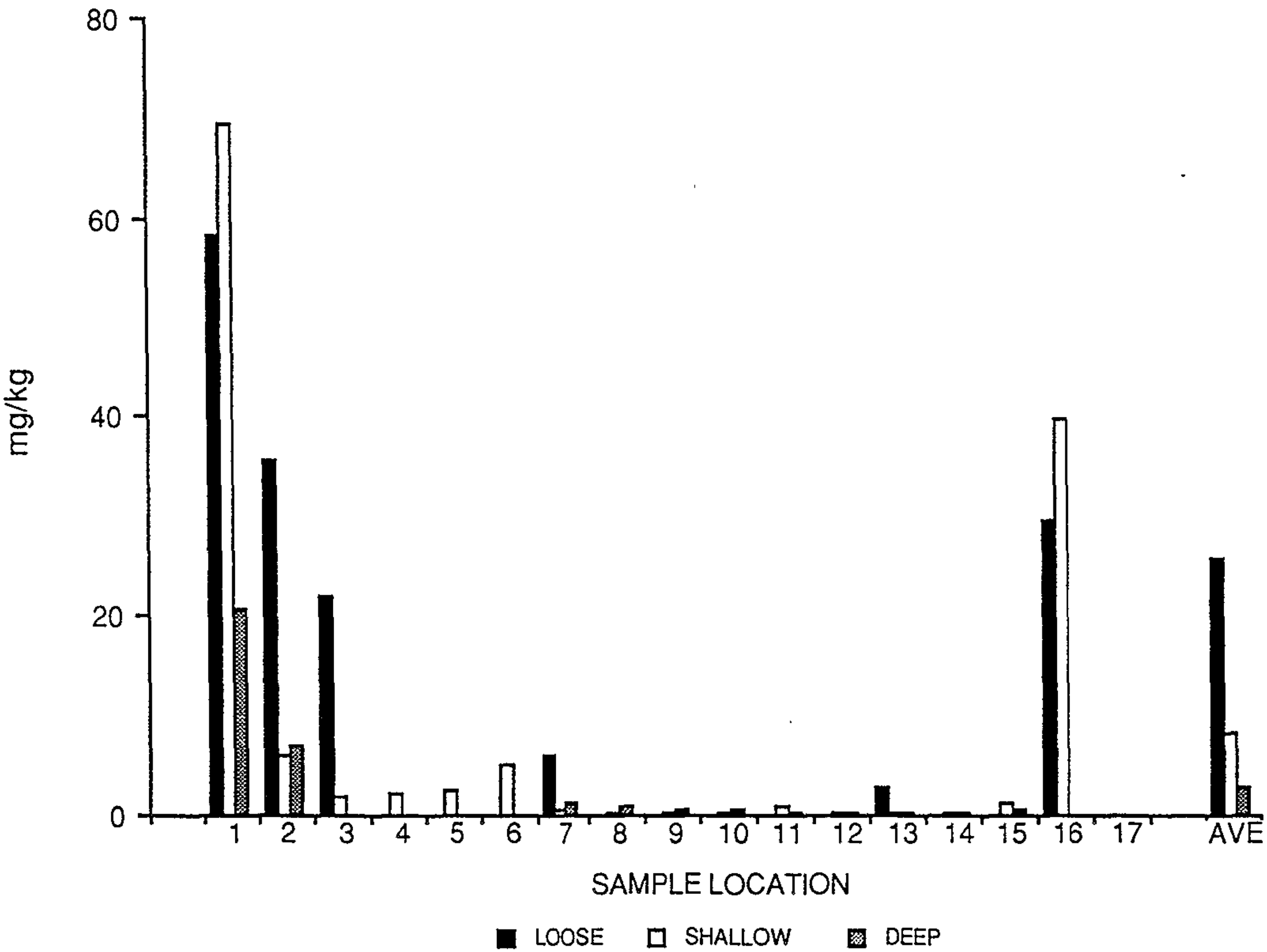

CHROMIUM IN THE EAST TRENCH
mg/kg
600
500
400
300
200
100
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
AVE
SAMPLE LOCATION
LOOSE
SHALLOW
DEEP


COPPER IN THE EAST TRENCH
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
mg/kg
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
AVE
SAMPLE LOCATION
LOOSE
SHALLOW
DEEP

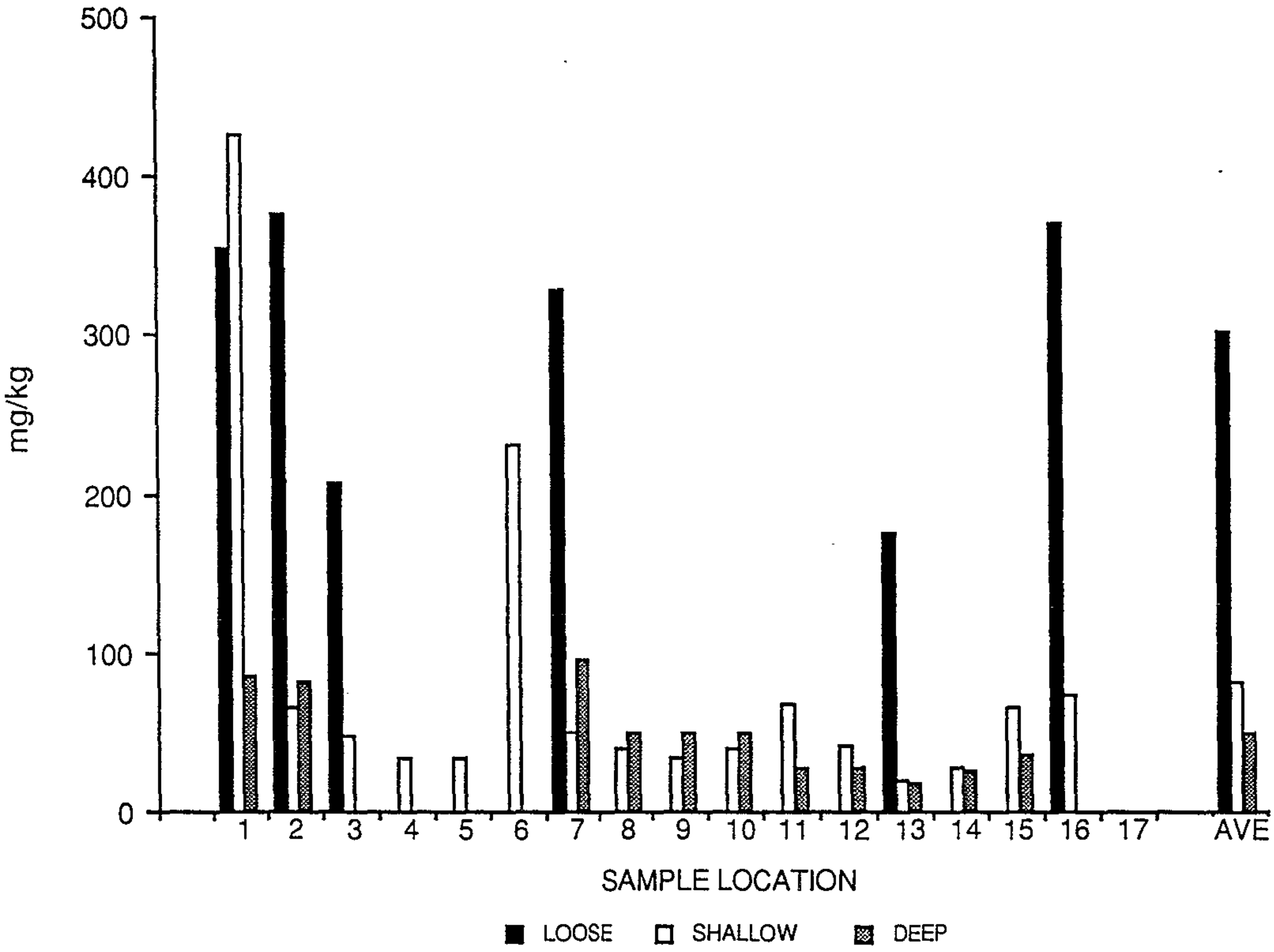
LEAD IN THE EAST TRENCH



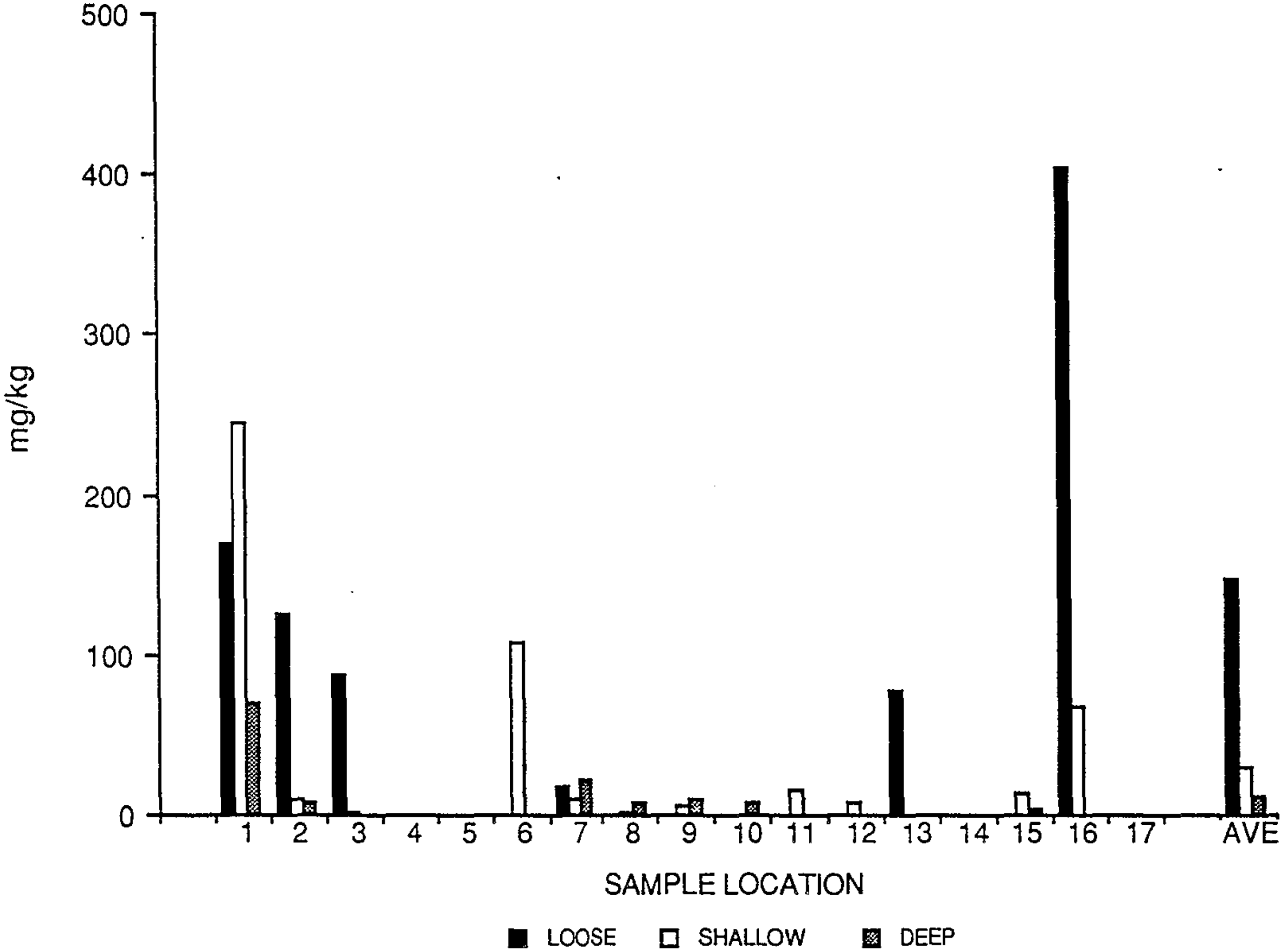
MERCURY IN THE EAST TRENCH

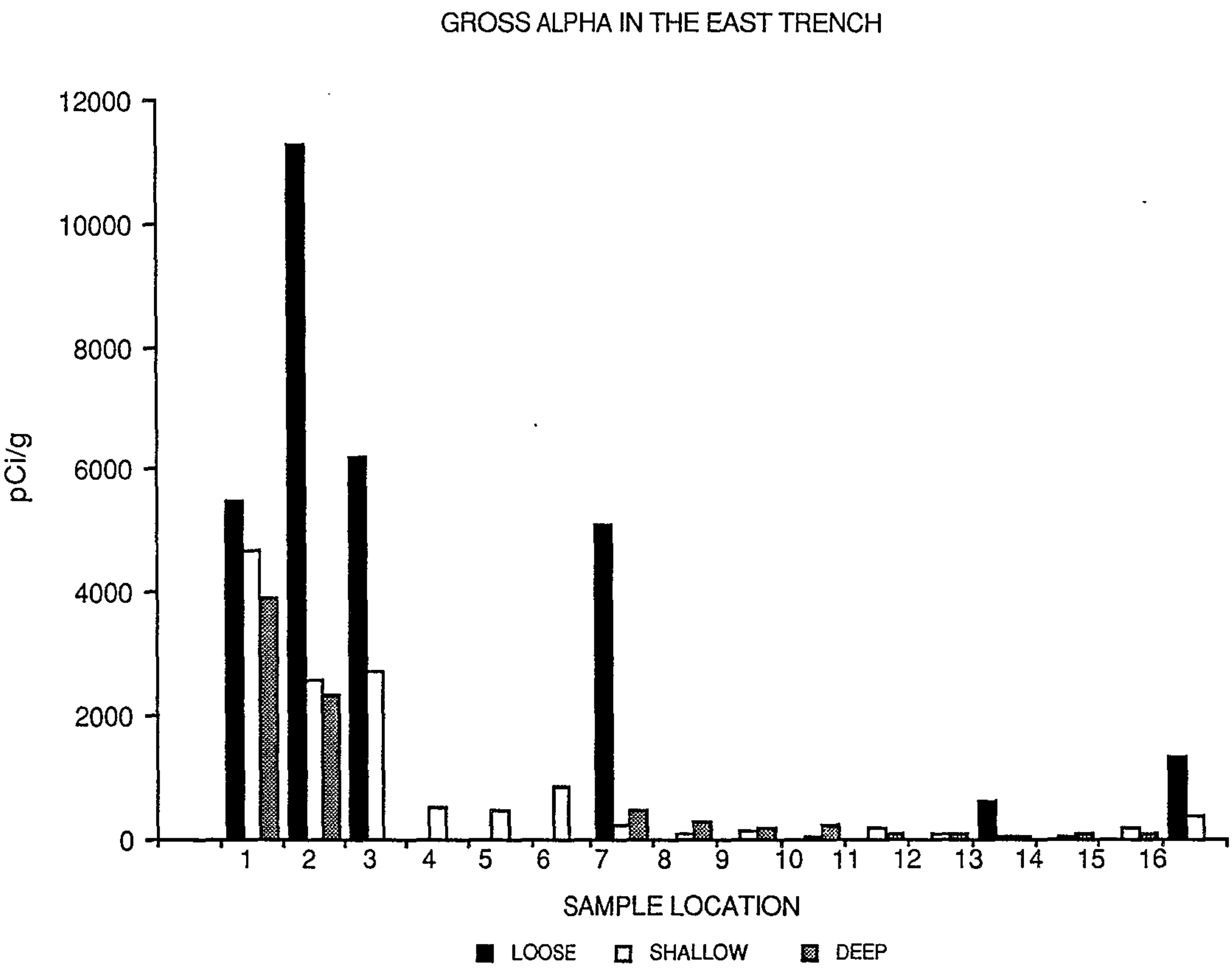


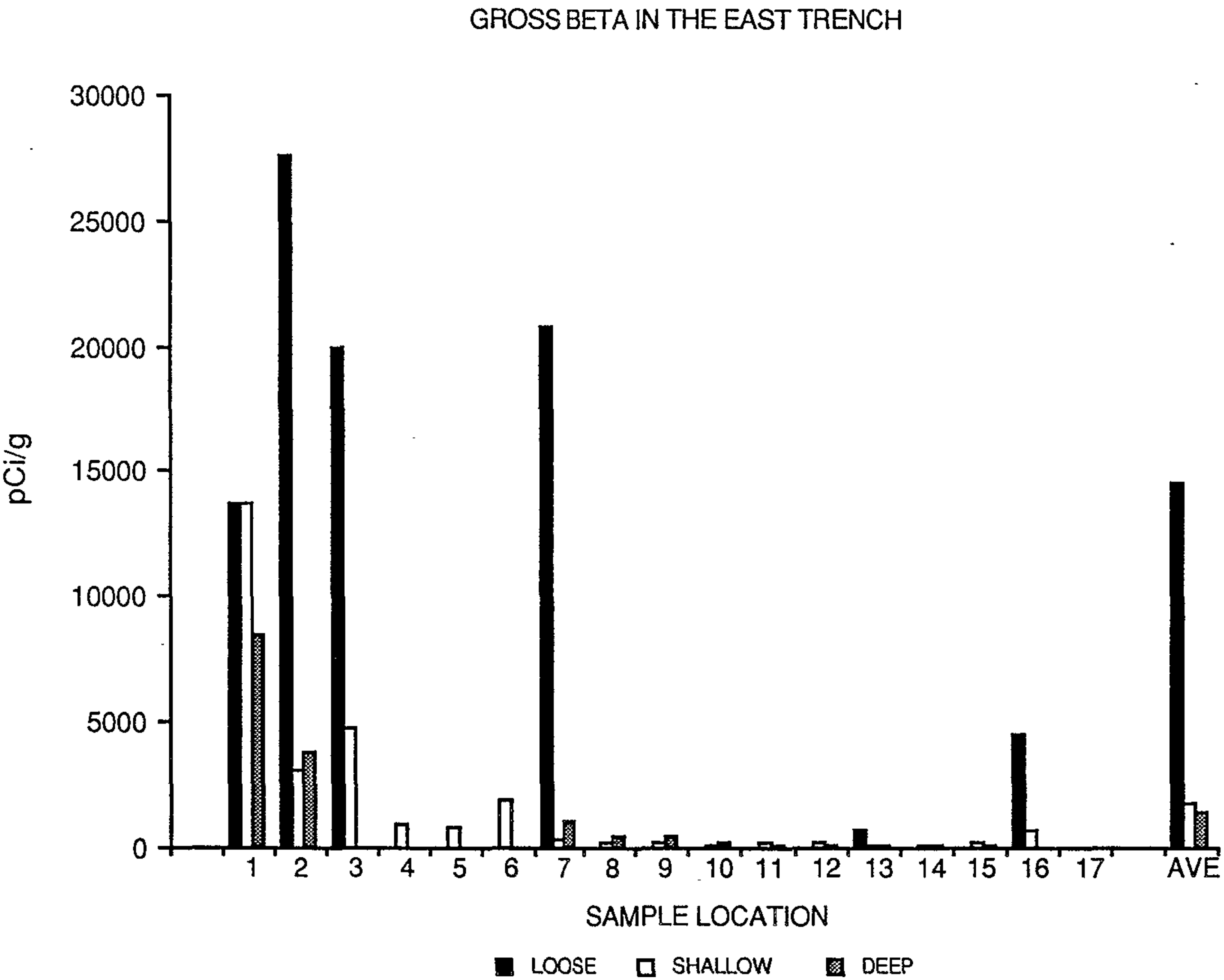
NICKEL IN THE EAST TRENCH



SILVER IN THE EAST TRENCH




GROSS ALPHA IN THE EAST TRENCH
12000
10000
8000
6000
4000
2000
0
pCi/g
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
SAMPLE LOCATION
LOOSE
SHALLOW
DEEP


GROSS BETA IN THE EAST TRENCH
30000
25000
20000
15000
10000
5000
0
pCi/g
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
AVE
SAMPLE LOCATION
LOOSE
SHALLOW
DEEP

APPENDIX E

EXPEDITED RESPONSE ACTION PROJECT MANAGEMENT PLAN FOR THE 316-5 PROCESS TRENCHES

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1.0 INTRODUCTION

The purpose of this Project Plan is to 1) provide a brief description of the Expedited Response Action (ERA), and 2) define the administrative and institutional tasks necessary to support the ERA for the 316-5 Process Trenches. The plan defines the responsibilities of the participant organizations, organizational structure, and project tracking and reporting.

The United States Environmental Protection Agency (EPA), the State of Washington, and the U.S. Department of Energy (DOE) have signed an Agreement in Principle which allows the DOE to propose selected sites to the regulators for expedited response action consideration. The 316-5 ERA will be conducted in conjunction with the ongoing remedial investigation/feasibility study (RI/FS) activities for the 300-FF-1 and 300-FF-5 Operable Units. The ERA has been classified as a non-time-critical response action by the EPA and requires the preparation of an Engineering Evaluation and Cost Assessment (EE/CA). After the EE/CA is prepared an ERA Proposal will be developed and submitted to the regulators for approval.

1.1 BACKGROUND

On October 18, 1990, an Agreement in Principle between the DOE, the EPA, and the State of Washington was signed. The agreement states that initially, three candidate sites will be considered for Expedited Response Actions. The agreement also states that the candidate sites under consideration would include, but not be limited to:

- 618-9 Burial Ground Remediation
- 300 Area Process Trenches sediment removal
- 200 West Area Carbon Tetrachloride treatment.

In accordance with the October 18, 1990, agreement, the DOE proposed the selected projects to the EPA and Ecology for review of costs, technical basis, and project feasibility. The projects which meet regulatory approval will then be proposed to the public for comment prior to issuance of final approval for initiating a specific project.

The proposed projects were selected following a limited evaluation of seven sites by DOE and EPA. The DOE proposed the candidate sites for primary consideration, with the remaining sites deferred for future consideration. A selection process is currently under development for use in identifying future ERA sites.

2.0 FACILITY DESCRIPTION

The 316-5 Process Trenches is an active Resource Conservation and Recovery Act (RCRA) Treatment, Storage and Disposal unit located in the 300-FF-1 process liquid operable unit (Figures A and B). The unit also impacts the 300-FF-5 groundwater operable unit. Both operable units are categorized as Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) past practice units (DOE, et. al., 1989). The trenches are located near the western boundary of the 300-FF-1 Operable Unit, approximately 300 meters west of the Columbia River. The trenches are approximately 458 meters in length, 3.5 meters deep, 3 meters wide at the bottom, and 10 meters wide at the top. The two parallel trenches are separated by an earthen berm. The bottom of each trench slopes slightly to the north and is approximately 20 feet above the water table. There is a small (30 meters by 50 meters by 3 meters) depression located at the northwest corner of the west trench. The depression was isolated from the west trench in June 1990, by an earthen berm constructed to facilitate placing screens over the trench.

The trenches, presently operated under a RCRA Interim Status Permit, were constructed and activated in 1975. Liquid effluent discharges to the trenches average 3500 lpm and range from 3000 liters per minute (lpm) to 4500 lpm. During peak activities in the 300 Area, discharge rates may be as high as 11,360,000 liters per day. In 1985, administrative controls were instituted to reduce and eliminate discharges of hazardous wastes to the process trenches. The present effluent discharge consists of 1) purified or potable water; 2) equipment cooling water; 3) laboratory and research facility waste water; and 4) precipitation (e.g., rain and snowfall runoff). The potable water and equipment cooling water are estimated to account for 70 percent of the flow discharged to the trenches. Substances discharged to the trenches, prior to 1985, were both slightly radioactive and hazardous. The fuel fabrication activities conducted in the 300 Area were probably the most significant source of contaminants. These facilities have not been operated since early 1987.

The effluent currently discharged to the trenches is not designated as a dangerous waste according to the procedure specified in the Washington Administrative Code (WAC), Chapter 173-303. Administrative controls which were implemented in 1985, require the effluent to meet drinking water standards.

In the future, the flow discharged to the trenches is expected to be greatly reduced. There are also plans to construct a facility to analyze and, if needed, treat the waste stream prior to release to the environment.

The 300-FF-1 Operable Unit Work Plan (DOE/RL 88-31) provides information concerning potential and known contaminants in the trench sediments.

3.0 ERA ACTIVITIES

The activities associated with the ERA have been divided into three phases, described as follows:

The first phase of the ERA is to develop the necessary documents required to perform the ERA. The documents include the following:

National Environmental Policy Act (NEPA) Categorical Exclusion
Plant Forces Work Review
Project Plan
Decommissioning Work Plan
Cultural Resources Review
Radiation Work Permit
Restoration Safety Document(s)
Excavation Permit
Health And Safety Plan/Hazardous Waste Operations Permit
Quality Assurance Project Plan
ERA Proposal (including the Engineering Evaluation/Cost Assessment)

The second phase of the ERA will implement removal activities. Removal activities will consist of operations and maintenance type work to excavate accessible radioactive and hazardous contaminants which have been deposited in the bottom of the trenches. The contaminants in one trench will be removed while the second trench remains in operation receiving the process effluent. After removal activities in the first trench are completed, the effluent will be valved to that trench so the second trench can drain, allowing for removal activities to continue. The materials removed from the process trenches will be 1) consolidated in the north end of the trenches and separated from the active portion of the trench by clean fill material, or 2) consolidated with similar material in the 316-2 North Process Pond. After waste consolidation, interim stabilization will be performed to prevent contaminants from migrating until the Record of Decision selects the final cleanup method(s).

The work to be performed consists of removing approximately 2,500 to 3,000 cubic yards contaminated material from the lower portion of the 316-5 trenches. The material will be removed and transported with earth moving equipment (e.g., backhoe, scraper, dragline, dump trucks, dredge, etc.). The material will be placed in the north end of the trenches, or in the nearby inactive 316-2 pond and stabilized to prevent migration. The bird screens over the trenches will be set aside to allow for removal activities and replaced upon completion. Selected sections of fence may need to be temporarily removed to provide access for excavation equipment in and around the trenches or the North Process Pond. The work will be performed in accordance with WHC practices for interim stabilization of waste sites and ditch maintenance. The potential exists for the equipment to become contaminated. The removal activity will be monitored for radioactive and hazardous constituents through the use of field instruments (e.g., portable XRF analyzer, health physics instruments, air monitors). After completion of the removal activities, the equipment will be decontaminated, to the extent possible, in the trench area prior to completion of interim stabilization.

The final phase of the ERA involves preparation of a final report describing the accomplishments of the ERA.

The schedule for the ERA requires that many activities be performed simultaneously. The ERA is divided into 3 phases: 1) preparation and approval of necessary documents to conduct removal and related activities; 2) removal and related activities; 3) preparation of a final report of ERA activities. A proposed schedule is provided as Figure 3.1.

4.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization is graphically illustrated in Figure 4.1. The following narratives briefly describe the responsibilities of the resource organizations involved in the ERA.

Environmental Engineering Remedial Action Section

Provides project management lead and coordinates technical resources for the ERA. Prepares, or coordinates, the necessary documents to accomplish the ERA. Obtain services of Environmental Engineering Group for field screening of soil. Prepares a final report summarizing the ERA.

Environmental Engineering

Provides support as necessary to complete the ERA.

NEPA Documentation

Ensures that the necessary NEPA documents required for the ERA are approved and in place.

Environmental Field Services

Prepare and provide approved industrial health and safety documents (e.g., HWOP). Provide site safety officer and health monitoring during removal and related activities. Provides a letter report summarizing the health and safety aspects of the ERA to the Environmental Engineering Group for the final project report.

Environment, Safety, Health and Quality Assurance/Occupational Safety and Health/Health and Safety Assurance

Ensures applicable occupational health and safety requirements are appropriately addressed. This includes: 1) Health Physics support to prepare and issue the necessary Radiation Work Permit (RWP), provides necessary HPT support during removal related activities and preliminary radiation survey(s) as required; 2) HWOP and Environmental Assurance review of documents as necessary; 3) and Industrial Safety and Fire Protection. Provides a letter report from each subgroup participating in the ERA detailing OS&H activities during the ERA to Environmental Engineering for the final project report.

Quality Assurance

Provides support to verify that appropriate quality assurance requirements are addressed. Provide surveillance of the ERA as necessary.

Environmental Protection

Provides support to ensure compliance with environmental regulations and Hanford Site requirements.

Hanford Restoration Operations/Decommissioning Engineering

Prepares and issues the decommissioning work plan which includes sampling for XRF analyses. Prepares necessary information (engineering costs, alternative descriptions) required for the EE/CA. Obtains excavation permit, equipment, and supplies to conduct removal and related activities. Coordinates labor, equipment, and conducts the removal and interim stabilization. Provides field supervision for the removal and related activities. Prepare summary letter report of the ERA removal and related activities.

Pacific Northwest Laboratory Cultural Resources

Provide documentation and support necessary to obtain the excavation permit.

Restoration Safety Documentation

Prepares and issues required activity safety document(s).

300 Area Landlord

Provides assistance as necessary to expedite any/all activities. Provides coordination with routine area activities.

Regulatory Analysis

Provides information and guidance on environmental regulations.

Environmental Projects

Provides information on other projects being planned or conducted in the area of the process trenches.

Grounds Maintenance and Equipment Operations (OSS)

Provides equipment and equipment operator as necessary in support of the ERA.

5.0 DOCUMENTATION AND RECORDS

The documents generated during the ERA will be categorized in accordance with the Hanford Federal Facility Agreement and Consent Order. All documents except the ERA Proposal will be considered secondary documents. The ERA Proposal (primary document) prepared by Westinghouse Hanford Company, will be reviewed by the regulators (EPA and Ecology) and DOE-RL. After the regulatory review, a 30-day public comment period is scheduled. Following the public comment period the EPA is expected to issue an Action Memorandum which officially documents approval of the ERA.

Internal review and approval of documents required to perform the ERA will be conducted to ensure the activities are performed in a safe and effective manner. The appropriate organizations which implement an activity will review and approve the documentation in conjunction with safety and quality assurance.

Records and reports generated during the ERA will be forwarded to the EEG for inclusion in the project records maintained by the Project Engineer in accordance with WHC-CM-7-7, "Environmental Investigation and Characterization Manual," EII 1.6, "Records Management." The appropriate records will be incorporated into an administrative record, which will be available for public review.

6.0 QUALITY ASSURANCE

Quality assurance for the ERA will be addressed in the Decommissioning Work Plan which will refer to the 300-FF-1 Wok Plan and/or Environmental Investigation Instruction (EII) requirements as appropriate. The Quality Assurance personnel will perform routine surveillance activities to ensure compliance with controlling documents.

7.0 FINANCIAL AND PROJECT TRACKING REQUIREMENTS.

Westinghouse Hanford Environmental Engineering will have the overall responsibility for planning and controlling the ERA activities, providing effective technical, cost, and schedule baseline management. The management control system used for this project must meet the requirements of DOE Order 4700.1, Project Management System (DOE 1987), and DOE Order 2250.1 B, "Cost and Schedule Control Systems Criteria for Contract Performance Measurement," (DOE 1985). The Westinghouse Hanford Management Control System (MCS) meets these requirements. The primary goals of the Westinghouse Hanford MCS are to provide methods for planning, authorizing, and controlling work so that it can be completed on schedule and within budget, and to ensure that all planning and work performance activities are technically sound and in conformance with management and quality requirements.

8.0 REFERENCES

DOE, 1985, Cost and Schedule Control Systems Criteria for Contract Performance Measurement, DOE Order 2250.1B, U.S. Department of Energy, Washington, D.C.

DOE, 1987, Project Management System, DOE Order 4700.1, U.S. Department of Energy, Washington, D.C.

Ecology et al., 1989, Hanford Federal Facility Agreement and Consent Order, Washington Department of Ecology, U.S. Environmental Protection Agency, and Department of Energy, Olympia, Washington.

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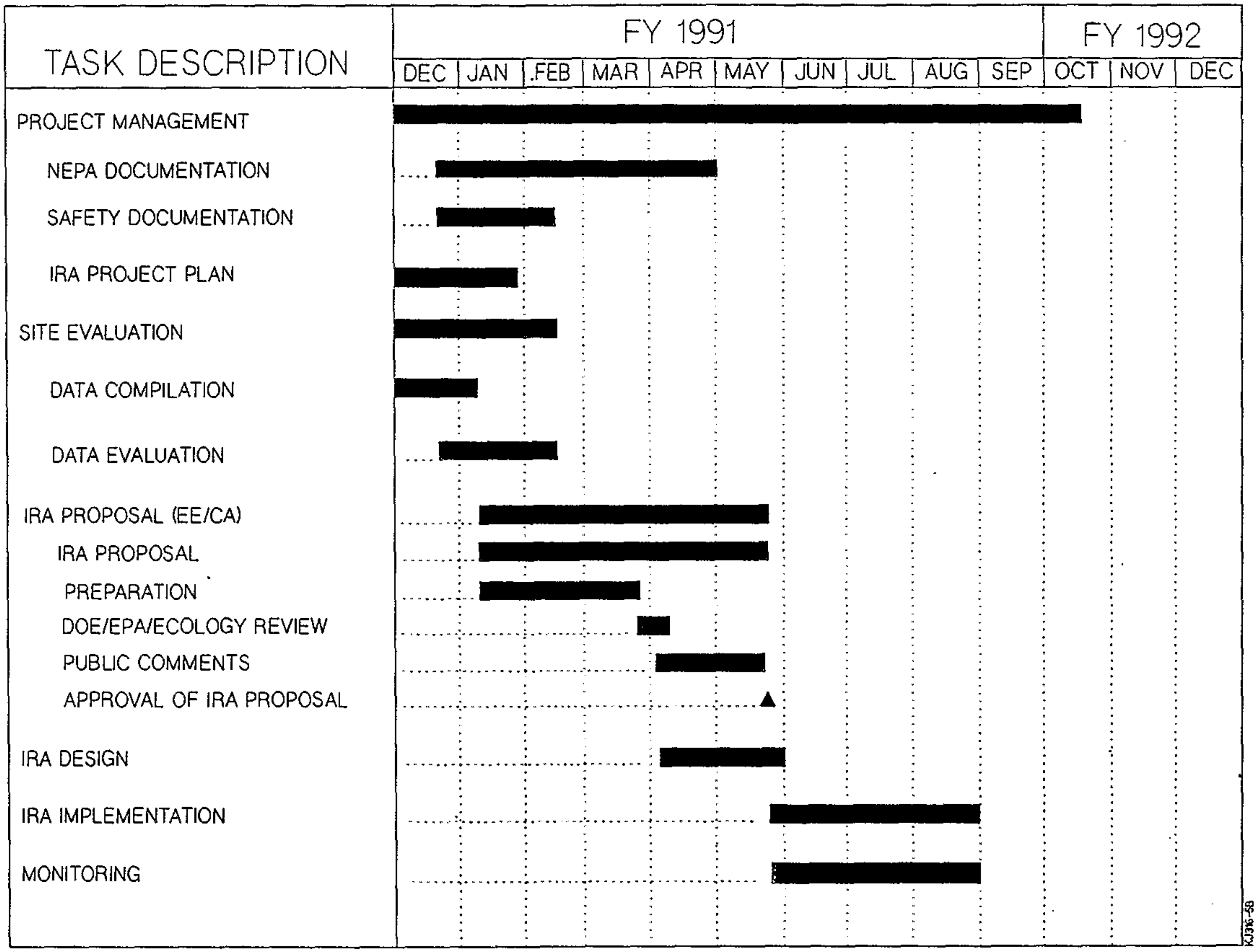
316-5 TRENCHES



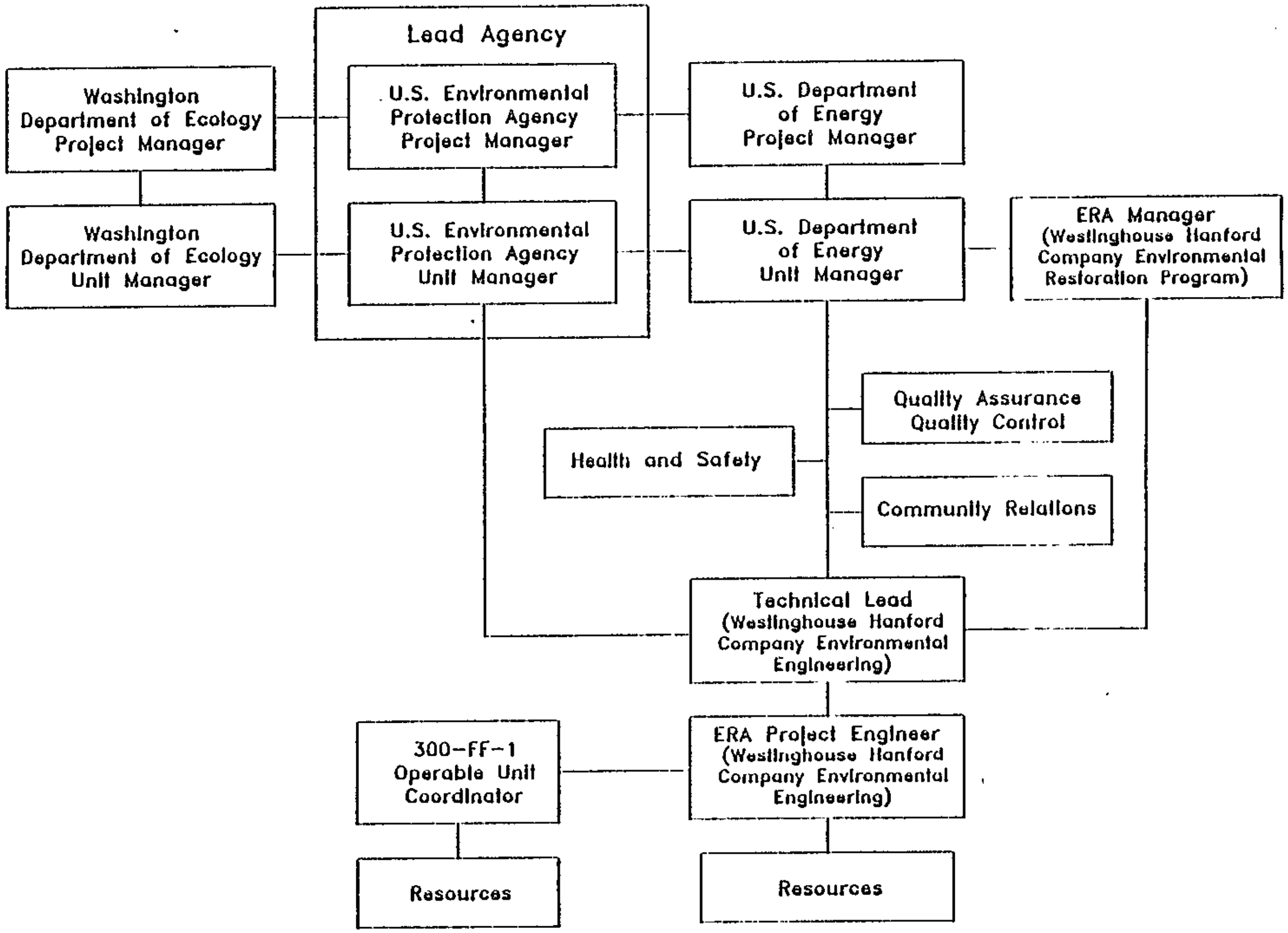


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Figure 4-1. Project Organization.

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